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**Supply-side incentives, medical effort and quality of
care in a lower-middle income setting: studies of
public and private doctors in the Philippines**

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2009


Thesis submitted to the University of London
for the Degree of Doctor of Philosophy

Health Policy Unit
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Abstract

Too often, patients in low and middle income countries receive inadequate quality healthcare. Technical capacity constraints – insufficient availability of competent health professionals, medicines and other essential inputs – are often seen as the cause. Whilst undoubtedly important, these constraints cannot fully explain poorly delivered health services. This thesis explores how supply-side incentives also influence the quality of healthcare doctors deliver to patients. It uses the analytics of the principal-agent model as the starting point for illustrating the impact of different incentives on medical effort, and through this effort, the quality of healthcare. Insights and testable hypotheses emerging from this conceptual approach are then evaluated through empirical studies of doctors working in 30 districts in the Philippines, using a variety of econometric methods.

Data came from both primary and secondary sources. A first study explored the relationship between empirical measures of medical effort and the technical quality of healthcare. A second study analysed how various financial and non-financial incentives affect the amount of medical effort exerted by doctors on public hospital inpatients. A third study addressed the phenomenon of physician ownership of private pharmacies, and whether this has any adverse impacts on patients.

Results showed that whilst the relationship between medical effort and quality is not straightforward, low effort typically results in lower quality care. Subsequent results illustrated how supply-side incentives can lead to public hospital patients with equal health need being treated unequally; and pharmacy-owning physicians unduly influencing a patient's use and expenditure in pharmacies. Suggested policy reforms are based on reshaping the incentive structure within which doctors operate, including reform of provider payment mechanisms and patient charges; improved monitoring and regulation; and policies to encourage greater use of generic drugs.

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Abbreviations and Acronyms

AIC	Akaike Information Criterion
CP	Clinical package (received by hospital inpatient)
DOH	Department of Health (of the Philippines)
FIES	Family Income and Expenditure Survey (Philippines)
FPS	Family Planning Survey (Philippines)
IOM	Institute of Medicine
LGU	Local Government Unit (of the Philippines)
LIC	Low-income country
LMIC	Lower-middle income country
MAT	Medication administration type (received by hospital inpatient)
NHA	National Health Accounts
NOH	National Objectives for Health (of the Philippines)
NSO	National Statistical Office (Philippines)
OOP	Out-of-pocket health expenditure
OTC	Over-the-counter purchase of medicines (as opposed to prescribed)
PHIC	Philippine Health Insurance Corporation
PHP	Philippine Pesos (currency unit)
PP	Patient perceptions (of healthcare received by hospital inpatient)
QIDS	Philippine Quality Improvement Demonstration Study
WB	World Bank
WHO	World Health Organization

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Chapter 1: Introduction

1.1 Why incentives matter

Too often, patients in low and middle income countries receive inadequate quality healthcare. This reduces the likelihood of patients making a full recovery from illness, and also deters them from utilising health facilities. Technical capacity constraints – insufficient availability of competent health workers, medicines and other essential health inputs – are often seen as the cause of low quality healthcare. Whilst undoubtedly important, these factors cannot fully explain poorly delivered health services, particularly as the quality of care received by patients is not constant across or even within health facilities (WHO 2000; World Bank 2004). Moreover, studies have shown that doctors often under-perform relative to their actual clinical knowledge (Das *et al.* 2008), with interventions focused on training having mixed and sometimes disappointing results (Rowe *et al.* 2005). That is, provision of low quality healthcare is not simply a technical problem that can be resolved through extra resources for training and other activities, or indeed a better allocation of these resources.

The central premise underlying this thesis is that low quality healthcare provision is also an incentive problem (Pritchett and Woolcock 2004; Saltman 2002). These incentives are the various factors that influence individuals to behave in a particular way. The incentive structure can impact on the behaviour of both the providers and recipients of healthcare. In terms of supply-side incentives, the focus of this thesis, incentives affect the quality of health service delivery through the impact on the amount of medical effort health providers exert on patients. Incentives can be financial or non-financial, explicitly designed or more implicit in nature, have positive or perverse effects, and vary in their intensity (Frey 2000; Holmstrom and Milgrom 1991; Le Grand 2003).

The supply-side incentives most commonly studied in the literature relate to the methods by which health providers are reimbursed. These have been shown theoretically and empirically to affect health service delivery (Ellis and McGuire 1986; Evans 1974; Chaix-Couturier *et al.* 2000; Gosden *et al.* 2001). A specific provider payment mechanism can result in doctors (and other health workers) providing too little or too much healthcare, both of which have negative implications for the quality of health service delivery. This literature also shows a trade-off between risk selection (whereby providers prefer low-risk patients because they are cheaper to treat) and efficient production (Newhouse 1996). Moreover, the method of provider payment can lead to doctors giving preferential treatment to some patients over others, as in the case of differential patient charges (McPake *et al.* 2007). In light of these effects, policymakers in developed and developing countries have tried to design provider payment schemes that reward good quality care (McNamara 2005; Petersen *et al.* 2006).

The incentives faced by doctors are not only related to the method in which they are paid. Doctors, by virtue of their central role in a patient's healthcare coupled with the difficulty in observing their behaviour, also have the opportunity to engage in additional income-generating strategies. This can create perverse financial incentives. For example, physician dual practice and other financial links with health facilities may adversely affect a doctor's prescription and referral behaviour, because of the potential for financial gain (Eggleston and Bir 2006; Ferrinho, Van Lerberghe *et al.* 2004). These incentives can be especially strong in low and lower-middle income countries, due to a health worker's need to cope with inadequate salaries (Van Lerberghe *et al.* 2002).

More broadly, the incentive structure within which doctors and other health workers operate is shaped by the institutional environment: the laws and regulations governing the health sector, as well as conventions and norms of behaviour (North 1990). This determines to what extent doctors respond to the incentives inherent in provider reimbursement mechanisms and additional income-generating strategies.

For example, third-party monitoring of the healthcare delivered by providers, through formal or more informal contractual arrangements, can help offset provider responses to perverse financial incentives of a specific provider payment mechanism (Perrot 2006). Regulations that limit physicians from referring patients to other health facilities in which they have a financial interest can reduce perverse incentives related to additional income-generating strategies, as with the Stark Laws in the US (Manchikanti and McMahon 2007). More intrinsic psychological or sociological incentives will also counteract a doctor's response to perverse financial incentives, since most doctors are motivated by a sense of professionalism and concern for a patient's well-being, as well as by their income level (Mooney and Ryan 1993).

Thus the various incentives doctors face, that together make up the incentive structure within which doctors operate, play an important role in determining the quality of healthcare a patient receives. This thesis explores how the incentive structure influences the quality of healthcare doctors deliver to patients in low and lower-middle income country settings. It uses the analytics of the principal-agent model as the starting point for illustrating the impact of different incentives on medical effort, and through this effort, the quality of healthcare. Insights and testable hypotheses emerging from this conceptual approach are then evaluated through empirical studies of doctors working in 30 districts in the Philippines, using a variety of econometric methods. Data comes from both primary sources (interviews of pharmacy customers) and secondary sources (from the Philippine Child Health Experiment).

1.2 Thesis outline

The thesis is structured as follows. It starts with a review of the literature on how supply-side incentives affect the quality of health service delivery (chapter 2). This review incorporates the main theories that have been used to characterise the impact of incentives on healthcare quality, and the related empirical evidence that assesses

how different aspects of the incentive structure have influenced health service delivery. It also includes discussions of how quality has been measured in relation to healthcare, and the different types and characteristics of incentives faced by individuals.

The following chapter, building on findings from the literature, develops a conceptual framework and associated empirical methodology (chapter 3). The conceptual framework shows the expected theoretical effects of different incentives on medical effort, and consequently the quality of healthcare. The empirical methods used to test these theoretical insights are then introduced. This includes a description of the data used. Background information on the Philippines is given in chapter 4, with details of how healthcare is financed and organised, factors that influence the incentive structure within which doctors operate.

Three results chapters follow (chapters 5, 6 and 7). The first of these explores the relationship between empirical measures of medical effort and the technical (as opposed to interpersonal) quality of health service delivery. The second results chapter analyses how various financial and non-financial incentives affect the amount of medical effort exerted by doctors on public hospital inpatients. The last results chapter assesses whether the financial incentives inherent in physician ownership of private pharmacies can cause them to unduly influence a patient's pharmaceutical purchasing decisions and expenditure.

The final chapter (chapter 8) brings together the main findings from these results chapters, considering them in relation to the literature and the conceptual framework. This is followed by reflections on the broad methodological strengths and limitations of the thesis. The chapter concludes by discussing policy implications, both for the Philippines and for low and lower-middle income countries in general, and potential areas for future research.

Chapter 2: Literature Review

2.1 Introduction

Supply-side incentives have an effect on the quality of healthcare a patient receives through their impact on the amount of medical effort¹ health providers exert on patients. A number of theories explore the implications of different incentive structures on the delivery of health services. Most prominent amongst these are those based on the principal-agent model, the new institutional economics literature and theories examining the determinants of worker motivation. Empirical evidence comes from research on the consequences of different provider reimbursement mechanisms on health service delivery; the role of various income-generating strategies adopted by health workers; and the effect different patient characteristics has on provider behaviour.

A common problem examined by this theoretical and empirical literature is the potential for conflicts in the incentives faced, particularly between the doctor and patient (or, more generally, between the health provider and purchaser of healthcare). Better incentive alignment can be understood as the fundamental policy challenge addressed by this literature.

However, before this theoretical and empirical literature on the impact of incentives on the quality of healthcare is explored, it is useful to first clarify what is meant by incentives and quality in the context of the health sector. Thus *section 2.2* examines how the quality of health service delivery has been understood and measured by researchers; and *section 2.3* discusses how incentives can be conceptualized.

Subsequently, *section 2.4* considers the theories that have analysed the impact of supply-side incentives on healthcare quality, with *section 2.5* reviewing the relevant

¹ See the conceptual framework in the following chapter (section 3.1) for a definition and detailed discussion of effort in the context of healthcare.

empirical evidence. Finally, *section 2.6* highlights some of the main limitations of the literature, and how these limitations have shaped this thesis.

The search strategy for identifying the relevant literature to review was based on keywords and MeSH terms related to one or more of sections 2.2 to 2.5, namely:

- “Quality” and associated MeSH terms (“quality assurance, health care”, “quality indicators, health care”, “outcome and process assessment”, “patient satisfaction”, “guideline adherence”, “program evaluation”), combined with terms related to healthcare delivery or measurement.
- “Incentives” and associated MeSH terms (“motivation”, “reward”, “employee incentive plans”, “physician incentive plans”, “reimbursement mechanisms”), combined with terms related to worker behaviour or healthcare delivery. Note that this strategy focused on supply-side incentives, excluding studies examining the effects of demand-side incentives.

Three electronic databases were used: PubMed, Embase and ISI Web of Science. The search was limited to articles written in English. This search strategy was complemented by manual reviews of the references of papers identified in these databases, and subsequent database searches of keywords emerging from these papers (including: principal agent/agency, new institutional economics, provider payment mechanisms, contracting, dual practice, pharmacy/ancillary facility ownership). Reference was also made to economics and public health textbooks, the Handbook for Health Economics, and the World Bank and World Health Organization websites.

2.2 Evaluating the quality of health service delivery

2.2.1 Healthcare quality: definitions, dimensions and scope

Before exploring how the quality of health service delivery has been measured in the literature, one needs to understand what is meant by quality. But defining quality of healthcare is problematic, since quality is an intangible concept, whose definition depends on the values of an individual or society (Reerink 1990). That is, quality is an essentially subjective concept. Nevertheless, it is useful for researchers and policymakers alike to define what are likely to be crucial components or dimensions of healthcare quality valued by society (Donabedian 1966; Ibrahim 2001; Klein 1998).

In arguably the landmark paper on measuring healthcare quality, Donabedian stated that: “the effectiveness of care... in achieving or producing health and satisfaction... is the ultimate validator of the quality of care” (Donabedian 1966). More recently, the US Institute of Medicine (IOM) defined quality healthcare as “the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge” (Institute of Medicine 2001). The IOM stressed that poor quality can mean too much (*unnecessary*) as well as too little (*insufficient*) care.

These influential papers point to two important components of healthcare quality, components which various authors suggest as pervasive in all quality of healthcare definitions (Blumenthal 1996; Brook *et al.* 2000; Evans *et al.* 2001). These are:

- *Technical quality* (or *clinical effectiveness*). That is, healthcare should be as effective as possible in improving patients’ health, given current scientific knowledge. Moreover, patients should only receive health services whereby the health benefits significantly outweigh any health risks, and these services should be delivered in a technically excellent manner.

– *Interpersonal quality (or patient-centeredness)*. That is, patients should be treated in a humane and culturally appropriate manner, and be involved in decisions about their own treatment.

Stakeholders, depending on their circumstances, are likely to differ in the value attached to these dimensions of quality. For example, patients with chronic diseases may place more value on interpersonal quality relative to the technical quality of healthcare, as compared with patients that have more eminently treatable illnesses. Trade-offs may also exist, both within and across these two quality components. For instance, for certain complex cases, healthcare with the greatest chance of clinically benefiting the patient may also carry higher risks to the patient than other treatment strategies. More broadly, patient preferences may be at odds with the clinical effectiveness of healthcare.

The remainder of this review on the quality of health service delivery focuses primarily on the technical quality of the health provider (either the individual clinician or the health facility as a whole). Note that the focus is solely on the clinical side of healthcare, although it is recognised that non-clinical aspects of a health provider's care can also improve a patient's health outcome, for instance by improving access to care and adherence to drug regimens. See Chandler 2008 and Harris *et al.* 2001 for a further discussion of this literature.

2.2.2 Quality, equity and efficiency

In discussions of healthcare quality, an important conceptual issue is how to incorporate the notions of equity and efficiency. An interpretation of quality in the most fundamental of senses includes both equity and efficiency, assuming people value them, since quality is ultimately an endpoint composed of an individual's or a society's values (Reerink 1990).

However, efficiency and equity have typically been understood as conceptually distinct from the technical (and interpersonal) component of healthcare quality

defined in the last section. For instance, the *World Health Report 2000*, in defining the health system goals of improved health and better patient responsiveness, stressed that the distribution as well as the overall level of these goals mattered (WHO 2000). It also included an equity-related goal of fair financial contribution, which is distinct from the technical or interpersonal quality of healthcare. Furthermore, the World Health Report evaluated health systems' performance in relation to the resources available, thus implicitly incorporating the concept of efficiency.

Numerous other examples of hospital or broader health system performance measures adopted by policymakers exist. These include indicators related to the equity and efficiency of health service delivery, that are separate from technical or interpersonal healthcare quality (Evans *et al.* 2001; Groene *et al.* 2008; and OECD 2002 for examples from this literature).

Technical quality and equity

Equity in healthcare relates to a fair or socially just distribution of health, healthcare or healthcare financing (Wagstaff and van Doorslaer 2000; Williams and Cookson 2000). An important definition is that of horizontal equity, which is when there is equal treatment for individuals with equal health need, irrespective of income, gender or other non-health characteristics. Vertical equity, in contrast, refers to the unequal treatment of individuals who are unequal in relevant respects.

In relation to the technical quality of healthcare, equity can be understood as the fair distribution of clinically effective healthcare amongst a population. Further, horizontal equity implies that all individuals with equal need should receive the same technical quality of healthcare.

A broad literature has analysed how equity can be measured in the health system. Examples of equity measurement in the health system include health or illness concentration curves; benefit-incidence analysis; comparison of the utilization of

health services by different population groups; comparison of healthcare payments with ability to pay; analysis of the extent of catastrophic expenditure and impoverishment caused by healthcare payments. See O'Donnell *et al.* 2008 for an introduction into this literature.

Of most relevance to this thesis is comparison of health service utilization by different socioeconomic groups, particularly analysis of any variation in the quality of health services received. The main point of interest relates to whether incentives effect the distribution of good quality health services. The equity literature, though, rarely measures quality directly, instead assuming that the cost of healthcare is an accurate proxy for quality. This literature is included in the review of the impact of incentives on the quality of health service delivery in sections 2.4 and 2.5.

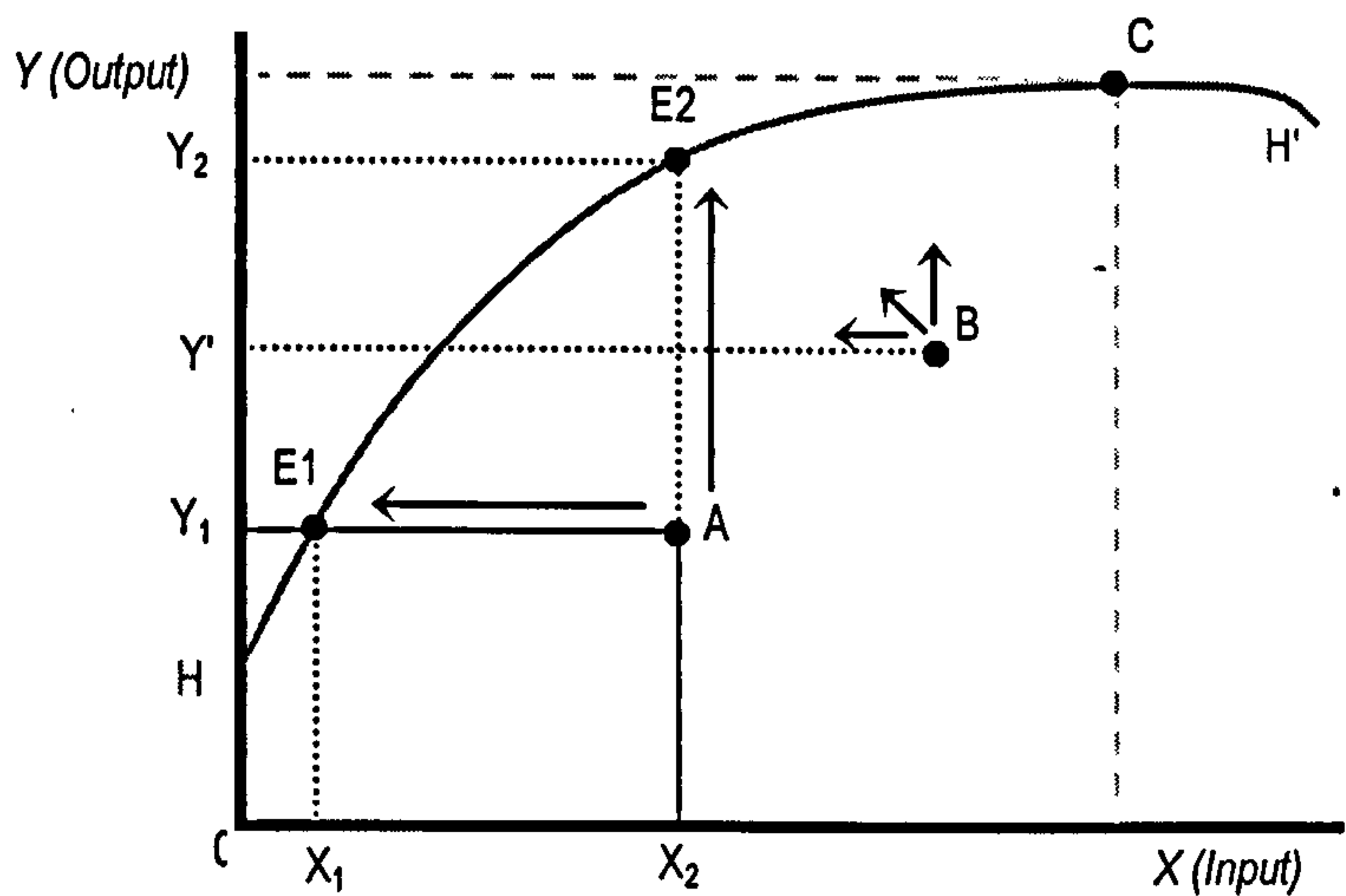
Technical quality and efficiency

Economists define efficiency as obtaining the best possible output from available resources (Varian 2006). In relation to the technical quality of healthcare, this output can be understood as improvement of a patient's health outcome. More generally, this output can be understood as any quality dimension (or, indeed, combination of dimensions) valued by society. That is, more output equates to more/better quality, with efficiency occurring when healthcare quality (however defined) is maximised *given* existing resources.

Figure 2.1 illustrates the relationship between efficiency² and the technical quality of healthcare. The horizontal axis refers to input X (for example, healthcare); the vertical axis refers to output Y (for example, improved health outcome of an individual or population). Points A , B , C , $E1$ and $E2$ can be interpreted as different health providers.

² This figure is limited to analyzing technical (as opposed to allocative) efficiency, since only one input and one output are considered.

Figure 2.1 Efficiency and the technical quality of healthcare



Note: HH' has been drawn to intersect the y-axis at a point above zero. This reflects that some improvement in the patient/s health outcome can occur irrespective of the healthcare provided by a health provider.

The curve HH' represents the production frontier: the maximum possible improvement in health outcome (Y) for any given amount of healthcare (X). That is, all points on the curve HH' are efficient, and equivalent to the best technical quality of healthcare given available resources.

For instance, comparing health provider $E1$ with provider A , the same improvement in the patient/s health outcome Y_1 is achieved with less healthcare ($X_1 < X_2$). Likewise, at $E2$ compared with A , a higher health outcome ($Y_2 > Y_1$) is achieved with the same amount of healthcare X_2 .

Point B illustrates potential trade-offs between efficiency and the technical quality of healthcare. Provider B achieves a better health outcome than provider $E1$ ($Y > Y_1$). However, this is only because of greater resource use. That is, provider B is less efficient than $E1$, since B is not on the production frontier (for instance at point $E2$, a better outcome Y_2 can be achieved with less health care).

In contrast, provider C is efficient and maximises technical quality. However, whether this is preferable to other points on the production frontier depends on the

relative value attached to improved health outcome as compared with the cost of increased healthcare.

Figure 2.1 also illustrates the relationship between technical quality and the quantity of care. The shape of the curve HH' implies diminishing returns to scale: increases in the input of healthcare lead to less than proportional increases in the output of improved health outcome. Further, after point C more healthcare results in worse health outcomes. This reflects the possibility of doctors giving too much care as well as too little care.

In summary, a health provider that provides a higher technical quality of care may be less efficient than a provider that provides a lower technical quality of healthcare, because of differences in quantity of resources used. At the same time, for health providers with the same resources, efficiency maximisation is theoretically consistent with quality maximisation. Finally, more care does not necessarily mean a better technical quality of care.

In empirical work on efficiency, though, measured outputs are typically related to the quantity of care (such as the number of inpatient days, outpatient consultations), with little account of the actual technical quality of the healthcare provided (Hussey *et al.* 2009). Exceptions include the work of McKay and Deily 2008; Mutter *et al.* 2008; and Zuckerman *et al.* 1994, which incorporate controls for quality differences when analysing hospital efficiency.

2.2.3 Quality measurement: the structure-process-outcome paradigm

Almost half a century ago, Donabedian suggested that quality of healthcare can be measured by observing its structures, processes and outcomes (Donabedian 1966). This general approach to quality measurement has remained at the centre of quality measurement today (Rubin *et al.* 2001). Structure, process and outcome measures can all be used to ascertain a health provider's technical quality. The key criteria are

that any measure be attributable to the health provider *and* be clearly associated with improved patient health outcomes.

Structure measures

‘Structure’ relates to the setting in which healthcare is delivered. This comprises attributes of labour inputs (such as the number and level of skill of health personnel), non-labour inputs (such as availability of medical equipment and drugs) and organisational structure (such as provider reimbursement methods).

The main advantage of structural quality measures is that they are relatively cheap and easy to measure: health provider surveys and inventories are often sufficient. However, although structural differences may well explain differences in provider behaviour, they do not have a direct causal relationship to better patient health outcomes (Donabedian 1980). Furthermore, they cannot measure the behaviour, and thus technical quality, of individual health workers. That is, they are useful in evaluating whether health facilities have an adequate structure to *potentially* provide clinically effective care, rather than whether they actually provide effective care.

Process measures

‘Process’ covers all aspects of the interaction between patient and health provider. It encompasses how well structural inputs are transformed into outputs by the health provider. Process of care is the most direct measure of a health provider’s technical quality, since process measures can be more easily attributed to the provider than structure or outcome measures. This strength of attribution is the key reason why many commentators on quality of care view process indicators as an essential measure of a health provider’s technical quality (such as Brook *et al.* 2000; Eddy 1998; Peabody, Taguiwalo *et al.* 2006; Rubin *et al.* 2001).

However, to be a valid indicator of technical quality, process measures need to have a strong relationship with patient health outcomes (Donabedian 1988). Hence process indicators are based on comparing a provider’s actual health service delivery

with adherence to guidelines on ‘best practice’ care, such as whether a patient received a particular medicine, procedure, diagnostic test or advice.

Numerous studies have demonstrated the clinical effectiveness of particular processes of care. Indeed, guidelines for best practice should ideally be based on strong evidence, such as (meta-analyses of) randomized clinical trials, with various observational study designs being valid alternatives under certain circumstances (Atkins *et al.* 2004).

However, guidelines are not always based directly on actual clinical evidence. Instead, the preferences of health workers and patients, as well as expert opinions and societal priorities, are often more important in setting guidelines than research results (Naylor 1995). Even when robust clinical evidence has been used to determine best practice, the translation of such evidence into guidelines is hampered by heterogeneous populations, case-mix and problems of implementation (Grol 2001). Further, most feasible process measures are usually data-driven indicators for very specific elements of the care process, rather than comprehensive measures of how care is delivered (Rubin *et al.* 2001). Process measures are also not valid for all patients undergoing a given procedure, and are more easily misunderstood than health outcomes (Birkmeyer *et al.* 2004). These pitfalls demonstrate that process measures need to be well designed if they are to be accurate measures of a provider’s technical quality.

Outcome measures

‘Outcomes’ refer to the outputs of healthcare, particularly better health outcomes (in terms of both mortality and morbidity) and patient satisfaction. Intermediate health outcomes can also be defined, such as blood pressure for hypertensive patients, blood tests (HbA1c) for diabetics and lost school days for children (Mainz 2003; Mangione-Smith and McGlynn 1998).

The key advantage of outcome quality measures is that they directly reflect health outcome (or other quality dimensions, such as interpersonal quality). Consequently, outcome measures focus attention on key health system goals, and can promote innovation (Evans *et al.* 2001; Goddard *et al.* 2002). Conversely, changes in patient health outcome are not fully attributable to health providers, with biological, socioeconomic and environmental factors all crucial determinants of changes in a patient's health status, together with stochastic factors. Thus for outcome measures to evaluate the technical quality of a particular provider, they need to control for differences in case-mix and other such factors, through appropriate risk adjustment measures (Iezzoni 1997b). Even with such controls, two literature reviews on risk-adjusted hospital mortality rates found them an inaccurate measure of the technical quality for individual hospitals, because of attribution issues (Pitches *et al.* 2007; Thomas and Hofer 1998).

Indeed, because of this extra statistical noise, outcome measures typically require comparatively large sample sizes. Mant and Hicks 1995 illustrated this, showing that if real differences in technical quality between 2 hospitals arising from different uptake of an effective intervention resulted in a 30% difference in mortality (30% V 21%), data would have to be collected on 369 patients in each hospital to show the mortality difference was not simply chance (with 80% power and 95% significance). This compares with needing only 12 patients per hospital if one compared differential uptake of this intervention. In low-income and lower-middle income countries (LIC and LMIC), such high data requirements limit the usefulness of outcomes as measures of health providers' technical quality.

Evidence on the links of structures and processes with health outcomes

In theory, structure, process and outcome are interconnected. Better outcomes are more likely when the process of healthcare is of good quality, which in turn is more likely when the provider has sufficient and appropriate resources available.

However, empirical evidence from high-income countries has typically indicated at best only a weak link between structural measures and health outcomes (Donabedian 1988; Brook *et al.* 2000). Still, some studies have found positive associations between the type and quantity of health personnel, and intermediate or final health outcome measures (Needleman *et al.* 2002; Pronovost *et al.* 1999).

More evidence has shown links between process measures and patient health outcomes. Indeed, Chen *et al.* 1999 found that process indicators were a far more important determinant of hospital mortality rates than structural factors in the US. A number of other studies in high-income countries found positive associations between process quality measures and in-hospital mortality or post-hospital survival, although the strength of these associations varied widely (see, for instance, Bradley *et al.* 2006; Granger *et al.* 2005; Higashi *et al.* 2005; Peterson *et al.* 2006).

In LIC and LMIC settings, studies have used process or structure measures to assess the technical quality of healthcare, and subsequently the determinants of technical quality (discussed in section 2.5). However, these studies have rarely linked process or structure measures explicitly to health outcomes (Das *et al.* 2008). Some of the few exceptions to this are studies by Barber and Gertler 2002 in Indonesia and Peabody *et al.* 1998 in Jamaica, who both found positive associations between process measures (vignettes) and intermediate health outcomes (child anthropometrics); and Peabody, Nordyke *et al.* 2006, who found a positive association between vignettes and self-reported health status in Macedonia.

Taken together, this evidence suggests that process measures are linked to patient health outcomes, and thus are useful measures of the technical quality of healthcare. The evidence on links between structural measures and health outcomes, though, is less apparent.

2.2.4 Technical quality measurement: methods of data collection

Sources of data for structural quality measures are relatively uncomplicated. These include health provider surveys and inventories of facilities' medical equipment and pharmacy stocks. Data sources for outcomes are more costly and time-consuming, and can require large samples, but are also conceptually straightforward. They involve following up patients to measure mortality rates or assess morbidity (through quality of life measures or use of intermediate health outcomes).

Methods of data collection for the process of care, though, are more challenging. At the one extreme, the '*standardized patient*' has been seen as a gold standard for measuring process of care (Beullens *et al.* 1997; Luck and Peabody 2002).

Standardized patients are individuals who have been trained to accurately and consistently present a particular case, and after consultation with a doctor, report or judge the behaviour of the doctor on fixed criteria (Beullens *et al.* 1997). However, they are costly and can only be used for certain (less severe) conditions.

At the other extreme is the use of *administrative data*. This could be data used by health insurers to reimburse health facilities or individual doctors, such as the medicines and other health inputs used to treat patients with specific illnesses.

Another example is routine data collected by hospitals or other entities to account for the use of medicines and other health inputs, assuming such data are linked to the actual health services delivered. Administrative data are cheap and readily available, but are unlikely to be detailed enough to accurately measure the actual processes of care. For instance, Peabody, Luck, Jain *et al.* 2004 found that administrative data recorded the correct primary diagnosis in only 57% of consultations in the US.

Other retrospective data sources are provider surveys, patient exit surveys and record review. *Provider surveys* ask health workers how they treated particular patients; *patient exit surveys* ask patients with specific illnesses to describe the healthcare they received from a health provider. Both are cheap and straightforward to administer, but may suffer from recall problems. Further, provider surveys are more

prone to self-reporting bias: health workers may systematically exaggerate the amount of health services they provided to a patient (Adams *et al.* 1999).

Record review (also called *chart abstraction*) is where a patient's medical record (handwritten or electronic) is reviewed. These are cheap and can potentially offer greater detail on the actual health services delivered by a health worker than surveys or administrative data. However, in high-income countries, they are imperfect measures: for instance, Luck *et al.* 2000 found that in the US medical records identified only 70% of clinically necessary items performed, as recorded by standardized patients. In LIC and LMIC settings they may provide even less information on healthcare provided.

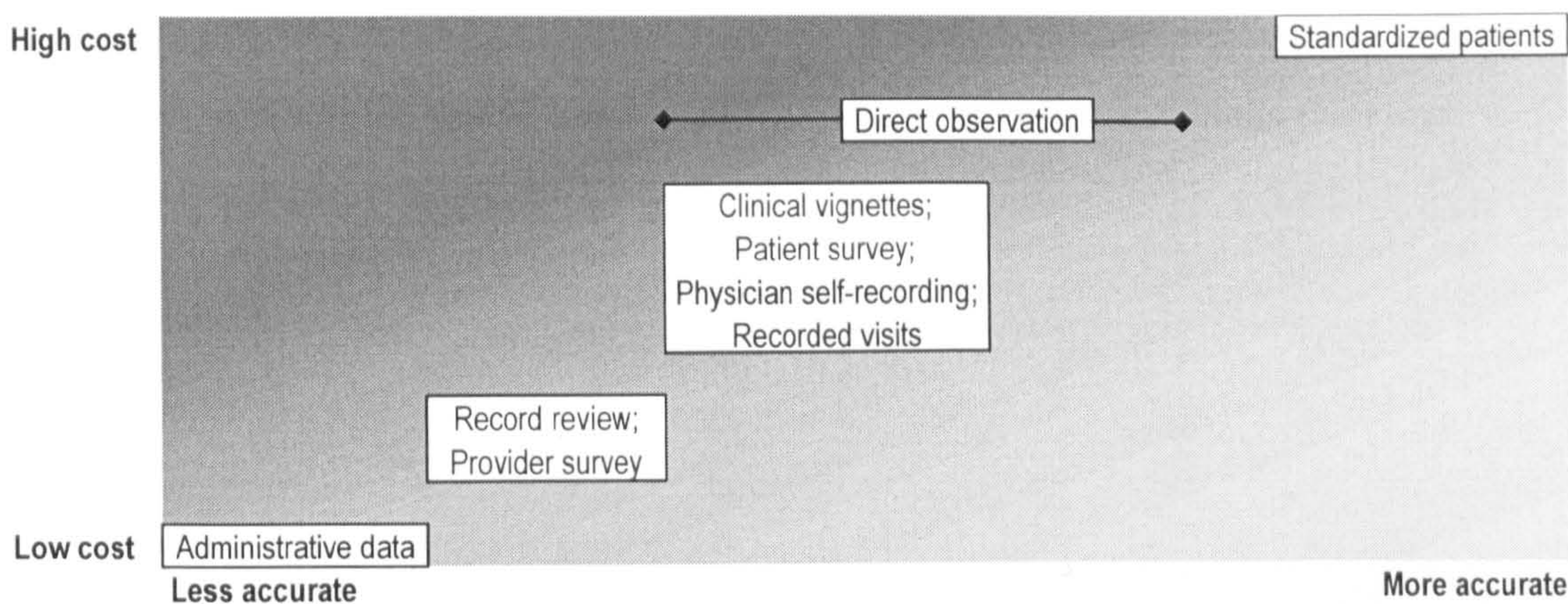
In comparisons of retrospective data collection methods in LIC settings, patient exit surveys were shown to give much more accurate measures of process quality than both provider surveys and record review (Franco, Franco *et al.* 2002; Hermida *et al.* 1999). This was based on comparisons with standardized patients or direct observation. However, patient exit surveys were also found to be the most resource-intensive of these three methods.

An alternative to retrospective data sources is to use *clinical vignettes*. This is where physicians are presented with case scenarios, and then asked how they would care for the patient in such scenarios. Although based on hypothetical behaviour, vignettes have been validated against standardized patients and shown to outperform record review as well as administrative data (Peabody *et al.* 2000). They are relatively cheap and easy to administer, and also have the added benefit of controlling for severity and case-mix more accurately than all other data collection methods described here. However, debate continues on whether vignettes measure all aspects of quality, with some arguing that they only measure a doctor's health knowledge, and not actual behaviour (Das *et al.* 2008).

Like the standardized patient approach, other methods use data collected during a provider-patient interaction. These are *direct observation* (where a trained observer sits in on physician-patient consultations), *recorded visits* (the use of audio or video equipment) and *physician self-recording* (where the physician records their own actions). By their nature, these approaches are more accurate than retrospective data sources or vignettes in recording what actually happened in a provider-patient interaction. However, recorded visits will not capture all aspects of the physician-patient interaction if physicians can control what is recorded. Physician self-recording, like provider surveys, are likely to be more prone to self-reporting bias. That is, physicians may over-report the amount of health services they provided, so that their technical quality of care appears better than it actually was. Moreover, all of these methods potentially suffer from the “Hawthorne effect”. That is, the doctor may give the patient better healthcare when the interaction is observed or recorded. Some studies, though, have shown this is likely to wear off after repeated consultations (for example, Leonard and Masatu 2006). They are also likely to be comparatively expensive, particularly the method of direct observation.

Figure 2.2 summarises these different methods of data collection in terms of their relative cost and accuracy in measuring the technical quality of a health provider. The figure is purely illustrative, being based on expected rather than actual relative costs and accuracy of the different methods.

Figure 2.2: The relative cost and accuracy of alternative process quality data collection methods



2.2.5 Obtaining quality scores

In all of the data collection methods described above, an important challenge is how to weight results such that the quality of different providers can be compared. For instance, it is not immediately evident whether a doctor who gave a patient a thorough physical examination but failed to give or request either of two needed laboratory tests, offers better or worse technical quality of healthcare than a doctor who gave an imperfect physical examination but requested one of the two needed laboratory tests.

Various approaches can be used to obtain a single quality score (with confidence or credible intervals) for each health provider. These (with quality-related examples in parentheses) include: Bayesian methods (Goodson and Jang 2008), multivariate approaches (Scanlon *et al.* 2005), nonparametric techniques (Lieberthal 2008), item response theory and other factor analysis related approaches (Das and Hammer 2005b) and expert panels / Delphi techniques (Peabody *et al.* 2000).

Finally, many of the quality measures are based on analysis of a small selection of health conditions. The validity of using a handful of conditions to evaluate broader

health system quality, or the ‘tracer’ methodology as its initial proponents Kessner, Kalk and Singer called it, depends on the nature of the tracer conditions chosen. These tracers are more likely to be more broadly applicable if they are frequent health conditions with a high associated burden of disease that are affected by healthcare, and with an agreed appropriate care and known epidemiology (Kessner *et al.* 1973, cited by Neuhauser 2004).

2.3 Conceptualizing incentives

Incentives, according to standard dictionary definitions, are anything that encourages an individual to behave in a particular way. They have been variously classified by incentive type, whether they are explicit or more implicit, the extent to which they have potentially undesirable as well as beneficial effects (i.e. if they create perverse incentives), and in terms of their intensity. These incentives can affect the behaviour of both the providers (supply-side) and purchasers (demand-side) of healthcare or other goods and services, although this literature review is limited to reviewing supply-side incentives.

2.3.1 Incentive types

In recent discussions on health policy, supply-side incentives have often been interpreted as being limited to financial benefits that are linked to certain behaviours (Saltman 2002). These can include non-pecuniary financial benefits, such as access to training, if they increase the probability of higher future earnings.

The importance given to financial benefits assumes that health workers have, at least to some extent, materialistic motivations. Whilst evidence demonstrates that this is undoubtedly the case, and the empirical component of this thesis focuses mainly on financial incentives, non-financial incentives have also been shown to influence worker behaviour, for both sociological and psychological reasons (see, for example, Fehr and Falk 2002; Frey and Jegen 2001).

Accordingly, incentives can be categorised into one of three broad types: financial, sociological and psychological. Table 2.1 summarises these three general incentive types, in terms of how they are expected to influence a health worker's behaviour, and examples of implications for patients.

Table 2.1 Financial, sociological and psychological incentives

<i>Incentive type</i>	<i>Why it is expected to influence behaviour</i>	<i>Some implications for patients: preferential treatment for whom?</i>
Financial	Maintains or improves a health worker's wealth: e.g. standard neoclassical microeconomic theory ¹	Patients from whom more revenues are received
Sociological	Maintains or improves a health worker's social relations: e.g. theories of reciprocity, trust, reputation and social capital ²	Patients with whom health workers socially interact with, especially those who can influence a health worker's social standing
Psychological	Intrinsic altruistic value attached to improving a patient's health: e.g. empathy, beneficence, professionalism ³	Patients who are perceived as being most in need (compassion), most deserving (justice), or who the health worker best empathises with

¹ Varian 2006; ² Woolcock and Narayan 2000; ³ Beauchamp and Childress 2001; Eisenberg and Miller 1987.

Financial incentives are sometimes referred to as economic incentives (as, for example, by Lindbeck 1997). However, in this thesis, economic incentives are more broadly defined as any incentive which has an impact on an individual’s utility. They therefore can include non-financial sociological and psychological incentives. See Rabin 1998 for a further discussion of incorporating non-materialistic factors into the utility function.

As well as explaining differences in healthcare delivery across patients, these incentive types can also explain why different health workers would treat the same patient differently. This is of particular relevance to the psychological literature related to incentives.

2.3.2 Explicit, implicit and perverse incentives

The health economics literature has focused predominantly on how explicit financial incentives can be used to shape health provider behaviour, particularly through the use of different provider payment mechanisms and regulation (Scott and Farrar 2002). But policymakers can also design explicit incentives that are more sociological or psychological in nature. Examples include setting up patient complaints boards and formally recognising good quality service provision (both of

which can additionally become financial incentives if accompanied by financial reward or penalty).

More implicit incentives may also be important influences on health worker behaviour. Sociological and psychological incentives are often implicit (Frey 2000; Le Grand 2003). For instance, the sociological incentive to give preferential treatment to patients with whom the health worker is more likely to receive reciprocal gains in the future is implicit in nature. Similarly, the psychological incentive for health workers to prioritise patients with whom they most closely empathise is also an inherently implicit incentive. Literature on the interaction between explicit financial incentives and more implicit non-financial incentives is reviewed in section 2.4.4.

Financial incentives can also be implicit. As noted by Scott and Farrar 2002, much of the research into this topic has come from the area of labour economics known as *personnel economics*³. This literature has demonstrated, for example, how concerns for future employment prospects or job promotions (“career concerns”) provide an implicit financial incentive for employees to work harder in their current employment.

Implicit incentives may also explain why explicit incentives sometimes result in perverse (undesired) as well as intended effects on a health worker’s behaviour. For instance, whilst replacing a payment system based on out-of-pocket patient expenditures with flat capitation payments removes the financial incentive for health providers to give preferential treatment to patients paying more, it also creates an implicit and perverse financial incentive to favour patients with less complicated illnesses, since these are cheaper to treat (known as ‘cream-skimming’).

³ See, for example, Lazear, E. (2000). “The future of personnel economics.” The Economic Journal 110: 611-639., for an introduction into this field.

Indeed, much of the theoretical literature that applies the principal-agent model to healthcare has focused on the perverse incentives of different financial compensation schemes (reviewed in section 2.4.1). This literature was informed by the groundbreaking paper of Holmstrom and Milgrom 1991. They introduced the concept of ‘multitasking’ – workers with jobs involving multiple related tasks – to demonstrate the likelihood of perverse incentives emerging in complex jobs. Using a principal-agent based model, they demonstrated how rewarding individuals on measured dimensions relevant to the firm’s output leads them to substitute effort away from other important but unmeasured dimensions. A large literature has discussed the consequences of targets and pay-for-performance (see section 2.5.1).

2.3.3 Incentive intensity

Financial incentives are often described in terms of their intensity, or whether they are high-powered or low-powered (Frant 1996; Tirole 1994; Williamson 1985). More intense or high-powered incentive schemes are those where the affected individual receives a large fraction of his or her marginal product (Tirole 1994). This is the case for most retrospective payment mechanisms, such as in fee-for-service. High-powered incentives are also inherent in organisational forms where any financial surpluses or losses are the responsibility of the health provider (whether this is a health facility or individual physician) – that is, where the provider is the residual claimant (Jakab *et al.* 2002).

Incentive intensity is also a useful concept in assessing the interactions between different incentive types: financial incentives are more likely to override conflicting psychological and/or sociological incentives the more high-powered they are, relative to these non-financial incentives. Interestingly, this implies that the notion of incentive intensity can be conceptualised for non-financial incentives as well. For instance, a high-powered sociological incentive could be inherent in treating a patient with significant influence on that health worker’s social standing. In general, the intrinsic psychological value attached by a health worker to treating a patient as effectively as possible is (hopefully) high-powered.

2.4 The impact of incentives on the quality of health service delivery: theoretical insights

2.4.1 The principal-agent model

Asymmetric information

Within the field of economics, the principal-agent model is established as the predominant theory to study how one group or individual (the principal) can affect the behaviour of another group or individual (the agent) through incentives (Dixit 2002; Laffont and Martimort 2002; Prendergast 1999)⁴. It is particularly useful in modelling the situation where the principal cannot perfectly observe the agent's actions: that is, where there is asymmetric information.

In his seminal paper on medical care markets, Arrow 1963 stressed the importance of asymmetric information problems in health care provision. Patients and secondary purchasers (insurers or government) are at an informational disadvantage to the health providers on the nature of health services delivered, which can have adverse effects on the healthcare patients receive.

Since this paper, the principal-agent model has been extensively applied to the health sector. The application most relevant to this thesis is where a health provider acts as the agent for a purchaser by providing health services in return for a payment. The provider/agent is usually interpreted as an individual physician or a health facility, with the purchaser/principal the patient or a third party purchaser acting on behalf of the patient.

Optimal contract design

Many papers have used the principal-agent model to explore optimal contract design (payment and monitoring mechanisms), where a health provider acts as the agent for

⁴ Also often referred to as *agency theory*, where the term 'agency' is understood in a broadly legalistic sense: that is, where an agent acts on behalf of others (the principal/s). This is distinct from more philosophical interpretations of agency, which are concerned with a human's *capacity* to make and impose (typically moral) judgments or choices.

a purchaser by providing health services in return for a payment. Central to all of these is the problem of *moral hazard*: to the extent that agents have better information than the principal on their own performance, they may engage in unobservable behaviours (hidden actions) which are not consistent with the principal's preferences (Varian 2006).

Zweifel and Breyer 1997 model the effects of alternative provider remuneration methods on the provision of healthcare. Chalkley and Malcomson 2000 present a comprehensive review of how, under various assumptions about the utility functions of principals and agents (including adaptation of the principal-agent model to include the interaction of these utility functions), government as the third party purchaser can design contracts with appropriate incentives for health providers. Liu and Mills 2007a show how agency theory in the labour economics and reward management literature can be used to compare different payment mechanisms, and give examples of how principal-agent theory has been applied to healthcare. The literature review of McGuire 2000 focuses on physician behaviour and their central role in influencing the health services used by patients. Scott 2000 examines the particular agency role of general practitioners. In the review of physician dual practice by Eggleston and Bir 2006, most economic theories of physician dual practice are based on the principal-agent framework.

From this large theoretical literature, some general implications for the payment and regulation of health providers (both health facilities and individual doctors) emerge:

– *Retrospective payment systems linked to health services create financial incentives to deliver as many services as possible.*

The main examples of such payment systems are fee-for-service and performance-based payments that are linked to health services provided. In these payment systems, the health provider is paid by the patient or secondary purchaser for the services delivered (that are reimbursed as part of the contract), and therefore no risk is borne by the provider.

Such retrospective payments can encourage the provision of a good technical quality of care, in the sense of discouraging under-provision. This is because providers are reimbursed for all services provided. However, they can also potentially lead to demand inducement by the health facility/physician (as first shown by Evans 1974)⁵. This can reduce the technical quality of care by encouraging the provision of unnecessary treatments. At a minimum, they provide no financial incentive to keep costs down.

More narrowly-based retrospective payments, such as pay for performance for specific actions, create financial incentives for health providers to undertake these actions, though to the detriment of other related but unrewarded actions (Scott and Farrar 2002).

– Salaries and prospective payment systems create financial incentives to deliver as few services as possible.

Common prospective payments are capitation, daily or case payments, and budgets. With such payment methods, the health provider is paid independently of the quantity of services delivered. Consequently, the provider can keep any surplus (prospective payment minus the cost of providing health services), but bears all the risk of any financial losses.

Whilst salaries and prospective payment methods provide incentives to keep costs down, they may also negatively affect the technical quality of care. This is because they reduce the financial incentive of providers to give patients all needed healthcare (Ellis and McGuire 1986). They can also encourage providers to refer patients to other health providers (which can have negative or positive quality impacts).

⁵ This reference and the other references included in these bulleted points refer to some of the key texts which have analysed each of these specific issues in the health sector.

Related to this is the concern that prospective payments can lead to patient ‘cream-skimming’. That is, health providers will prefer low-risk patients, since these patients are likely to be cheaper to treat. They may therefore adopt strategies to encourage such patients, and discourage higher risk patients from utilising their health services (Ellis and McGuire 1986; Hausman and Le Grand 1999; Newhouse 1996). However, risk-adjustment, such as the use of diagnosis-related groups, can mitigate the financial incentive to favour low-risk patients in prospective payment methods.

– Mixed systems can offset these adverse effects.

The rationale behind this is that the perverse incentives of any single payment method are counteracted by incentives working in opposite directions in other payment methods (see, for instance, Barnum *et al.* 1995; Normand and Weber 1994; Robinson 2001). Examples include fee-for-service with decreasing reimbursement scales, fee-for-service combined with a total budget, and salaries or capitation with additional payments if specific production targets are met.

However, the precise optimal payment system will be a function of, amongst other things, the nature of information asymmetry between the principal/s and agent/s (Blomqvist 1991; Dranove 1988) and what exactly is under the control of the agent (Ellis and McGuire 1990). More fundamentally, the optimality of a mixed payment system is dependent on the relative importance of a physician’s concern for the patient’s health compared with his or her material self-interest (Chalkley and Malcomson 1998; Ellis and McGuire 1986).

– Physician dual practice creates both perverse and desirable financial incentives.

Physicians who work in both the public and private sectors in parallel face a perverse incentive to shirk, pilfer public supplies and to redirect patients to their private facilities, since this increases their income (see, for example, Brekke and Sorgard 2007). These negative incentives, though, may be counteracted by positive effects on the technical quality of care. For instance, dual practice may attract more

skilled health workers to work for the public sector (Bir and Eggleston 2003), and dual practice physicians may improve their public service quality because of reputation concerns (Gonzalez 2004). The net effect of dual practice is an empirical question, depending on the relative importance of these desired and perverse incentives.

– Regulation of provider behaviour can reduce the unfavourable characteristics of any specific payment system.

One set of solutions are based on improving the observability of an agent's actions. Examples include monitoring of the health provider by a secondary purchaser (such as a health insurer), peer review, and health education policies to improve patients' healthcare knowledge (see, for instance, Casalino 2001 and Shaw 2001). Another solution is direct regulation, such as limited lists or generic-only prescribing and rules on referrals. All of these solutions can be encouraged through the use of financial penalties or rewards.

Summary

Applications of the principal-agent model therefore demonstrate how various provider payment mechanisms all potentially create perverse as well as desired financial incentives. These can negatively impact on the technical quality and/or efficiency of health service provision. They also point to mixed payment methods, information-related policies and regulation of provider behaviour to counteract these perverse supply-side incentives.

2.4.2 New institutional economics

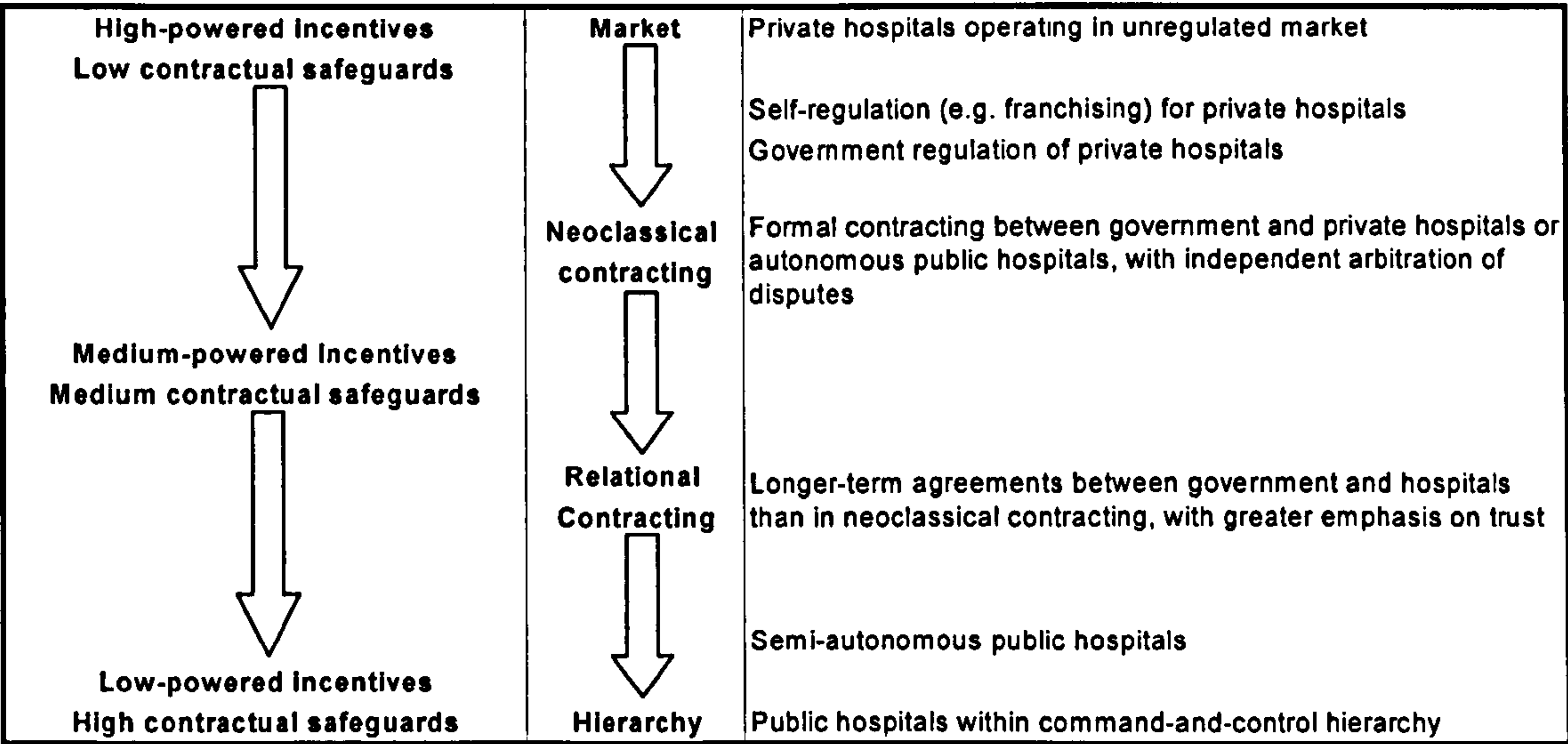
Institutions and incentives

The new institutional economics (NIE) literature does not analyse incentives *per se*. Its relevance to this thesis is instead in how institutions affect the incentive structure within which health providers operate. Institutions are, according to an influential NIE text, “the humanly devised constraints that structure human interaction. They are composed of formal rules (statute, common law, regulations), informal

constraints (convention, norms of behaviour and self-imposed rules of behaviour); and the enforcement characteristics of both” (North 1990).

The main relevance of NIE to health service delivery can be interpreted as analysing when governance structures with high-powered incentives are likely to be preferable to structures embodying low-powered incentives, and vice versa (Frant 1996; Williamson 2000). Figure 2.3 illustrates how these different governance structures relate to health facilities:

Figure 2.3: Different governance structures for hospitals (and other health facilities)



Williamson argued that the high-powered financial incentives embodied in unregulated market governance structures are preferable when there are low transactions costs. These are frequent transactions with low uncertainty, where outcomes can be easily measured and monitored, and assets used are not specific to the activity in question.

However, hierarchy or hybrid forms of contractual governance (relational and neoclassical contracting), which have lower-powered incentives, are expected to be more efficient for complex transactions, because of associated high transaction costs.

Such governance forms may have lower production efficiency than markets, but they are more effective at reducing transaction costs because of better contractual safeguards (such as provider regulation or cooperation/integration between purchaser and provider).

Health sector applications

Theories of NIE have been used by some authors to compare health providers with different ownership types, as well as analyse what form of governance is best suited to purchaser-provider relations and other aspects of the health system. Sloan 2000, in his review of private not-for-profit hospitals, points to lower transaction costs in these hospitals as compared with private for-profit hospitals as an important reason explaining why not-for-profits outnumber for-profits in all developed countries. Leonard 2002 argues that the hierarchical governance structure, coupled with decentralised flexibility in dealing with staff, helps explain why nongovernmental organizations have performed consistently better than both for-profit private facilities and public health facilities in Africa.

Preker *et al.* 2000 posited that in low-income countries most health inputs (other than human resources and knowledge) and simple outputs such as routine diagnostics and ambulatory care can be efficiently produced or delivered by the private sector, but this was less likely for the more complex outputs of hospital care. McKee *et al.* 2006 highlight quality and cost problems associated with experience in public-private partnerships for hospitals in various high-income countries, due to the complexity of the relationship.

Goddard and Mannion 1998, based on evidence from non-health sectors in high-income countries, argue that relational contracting is likely to be more efficient than more competitive governance structures for purchaser-provider relationships in the health sector. Palmer and Mills 2003 analysed the contracts private GPs had with the government in South Africa. They found that relational contracting more accurately

described this relationship than neoclassical contracting, and argued this was likely to be the case in most LIC and LMIC settings.

Summary

Institutions affect the incentive structure, and consequently how different actors are likely to respond to different incentives. That is, the NIE literature applied to healthcare shows how the incentives faced by health providers are shaped by the institutional environment. Further, because the transaction between providers and purchasers is often complex, NIE suggests high-powered incentives are likely to be less efficient than lower-powered incentives (with accompanying contractual safeguards, such as regulation) in the health sector. This does not preclude private providers, but does suggest that relational contracting or hierarchy are likely to be preferable to a less regulated market.

2.4.3 Incentives and group dynamics

Hospital behavioural models

A number of economic models have been developed to explain hospital behaviour. They assume that hospitals seek to maximise income, quantity of health services and/or service quality (see Liu and Mills 2007c). However, the majority of these models have been criticised for not reconciling their conceptual model with the internal hospital production structure (McGuire and Hughes 2002); and not being designed to predict changes in hospital behaviour occurring from exogenous changes, such as different hospital payment mechanisms (Liu and Mills 2007c). They have also been based predominantly on the US medical market (McPake and Normand 2008).

Most hospital models are therefore less relevant to the study in this thesis of the impact of supply-side incentives on health service delivery. One important exception to this is the recent model of hospital behaviour by McPake *et al.* 2007. This analyses the equity and quality implications of hospital two-tier charging schemes which are being pursued in many LIC and LMIC settings. They show that under

some circumstances extracting profit from a superior service requires a hospital to drive down the quality of the basic service. That is, two-tier charging can create financial incentives for a hospital to focus on patients paying the higher tier charge to the detriment of others.

Further, some earlier hospital models shed light on how the transmission of hospital level incentives to the medical staff actually providing health services depends on who are the key decision makers with hospitals, as well as the hospital's objective function. Newhouse 1970 identified hospital managers (administrators) as the decision makers. However, he assumed their goals (joint quantity-quality maximisation subject to a budget constraint) were perfectly aligned with the hospital's medical staff, implying no conflict between hospital level incentives and those of medical staff. Pauly and Redisch 1973 assumed physicians control decision making (with the aim of maximising their group income). Still, their model also implies no conflict in incentives, since physicians are the only decision making group.

In contrast, Harris 1977 analysed the impact of hospital management and medical staff having different objectives, arguing that both were key decision makers. This, he posited, explains internal allocation problems, such as cost overrun or excess capacity. It also implies that incentives introduced at the hospital level (by hospital management or external actors) will only transmit effectively to the medical staff if they are well aligned with the medical staff's objectives. Indeed, Crilly and Le Grand 2004 found that in the UK, consultants (health professionals) were motivated by the volume and quality of health services, whilst managers were motivated primarily by financial breakeven. However, they also found that consultants were more likely to influence a manager's motivation than managers were to influence the motivation of consultants.

Incentives in teams

Understanding how incentives impact upon team performance is important in healthcare because the treatment of a sick patient often requires coordination between multiple health professionals (Ratto *et al.* 2001; Scott and Farrar 2002). Team incentives arise when an individual's reward depends on the performance of others in a team, or the team is rewarded as a whole. That is, they can be understood as group level or interdependent individual level incentives.

Team incentives encourage cooperation. They also have the benefit of sharing risk, a desirable characteristic assuming health professionals are risk averse (Bradford 1995; Gaynor and Gertler 1995). However, team incentives suffer from a potential free rider problem: individuals have a financial incentive to shirk (Holmstrom 1982). This reduces the effectiveness of team incentives in encouraging greater effort by individuals, with consequently negative effects on the technical quality of care. Monitoring can counteract this, especially in small teams. More compressed wage structures may also reduce shirking, by improving cooperation in teams (Lazear 2000).

The target income hypothesis, though not explicitly analysing teams, also suggests interdependent incentives between individuals. It hypothesises that doctors have a target income, which is related to the income of other doctors (McGuire 2000). The target income can be related to incomes of doctors separate from the health facility (or team) where a doctor works, but is likely to be most closely related to doctors undertaking the most similar tasks. Further, it implies that below the target income, a doctor will be concerned with income and thus driven by financial incentives; but above the target income, a doctor will incorporate non-financial incentives that affect utility (Liu and Mills 2007b). However, the review by McGuire 2000 finds little empirical evidence supporting the target income hypothesis.

Summary

This theoretical work related to group dynamics illustrates the importance of a number of factors in financial incentive design. First, two-tier charging in hospitals can create an incentive for the hospital to favour patients paying more, to the detriment of other patients. Second, the relative influence of different individuals within a hospital (or other group) will determine how incentives at the hospital level impact on individual health workers. Third, because of risk aversion individuals may prefer group level incentives to individual incentives, but such incentives can lead to shirking and thus dilute their effectiveness. Fourth, the effect of individual level incentives on a health professional's behaviour may depend in part on his/her income relative to other comparable health professionals.

2.4.4 Theories of motivation

In understanding the impact of supply-side incentives on health service delivery, a number of authors have stressed the importance of more closely analysing the underlying determinants of worker motivation. This is in contrast to principal-agent theory, the new institutional economics literature and hospital behavioural models, where the implications of different assumptions about worker motivation are reflected in how different incentives are expected to influence behaviour, but motivation itself is treated as an exogenous factor.

Conflicts between different incentive types

A commonly cited concern in healthcare is how the introduction of explicit financial incentives can adversely affect more intrinsic psychological or sociological incentives related to a health worker's inner motivations (Franco, Bennett *et al.* 2002; Giacomini *et al.* 1996; Mooney and Ryan 1993; Scott and Farrar 2002). This concern is borne from theory and evidence on the determinants of motivation.

Early work on voluntary blood donation hypothesised that paying donors could undermine social values and thus actually reduce blood supply (Titmuss 1970).

More recent theoretical and empirical work, particularly from the fields of cognitive social psychology and behavioural economics, has formalised this hypothesis.

Fehr and Falk 2002 showed how the motive to reciprocate, the desire for social approval and the desire to work on interesting tasks can all potentially conflict with financial incentives. More generally, Frey 1997, 2000 demonstrated how extrinsic financial incentives can ‘crowd out’ the intrinsic reward of an activity, reducing the supply of an activity if it dominates the ‘relative price’ effect: the price, or financial opportunity cost, of not doing the activity. Frey and Jegen 2001 provided empirical evidence to support this theoretical insight.

Le Grand 2003 posited that small financial rewards can reinforce, or ‘crowd-in’, more intrinsic non-financial rewards; but as payments increase, the crowding-out and relative price effects predicted by Frey dominate. Le Grand stressed the importance of adopting ‘robust incentives’: financial incentives that align, and appeal to, self-interested (‘knavish’) and altruistic (‘knightly’) motivations. Examples in healthcare include allowing budget-holding professionals to keep surpluses on their budget if these surpluses are spent on improving patient care; or paying professionals fee-for-service at a rate that incorporates some sacrifice compared with alternatives.

Franco, Bennett *et al.* 2002 provide a conceptual framework outlining key determinants of health worker motivation, and how they are expected to interact. They posit multiple layers of influences: internal individual-level factors, organisational factors and broader cultural and community influences. Franco *et al.* 2004 apply this framework to selected hospital workers in Jordan and Georgia, finding that non-financial interventions may be more effective than financial reward in improving worker motivation.

The importance of context

The context in which health workers operate can also affect how they respond to incentives. Lipsky 1980 demonstrated that frontline providers had significant discretion in how they delivered services (hence he called them ‘street-level bureaucrats’), even in strictly regulated environments.

In healthcare, frontline providers are the health professionals who interact directly with patients. Consequently, understanding the context in which such health professionals work, including the incentives they face, is essential. If this is ignored, policies introduced can have unexpected effects when implemented.

Walker and Gilson 2004 applied these ideas in studying how nurses in busy urban primary care health clinics experienced and responded to the policy of fee removal. They found that although the nurses supported the policy’s broad principles, they resented its negative effect on their working conditions, and in implementation, they were slow in granting free access to certain patient groups. That is, a higher level policy directive only partially influenced frontline providers’ behaviour.

Summary

These theories of motivation stress not only the limitations of financial incentives, but also how they can negatively affect more intrinsic non-financial incentives. Further, the effectiveness of introducing policies with explicit incentives (financial or non-financial) is likely to depend on the context in which health workers work.

2.5 The impact of incentives on the quality of health service delivery: empirical evidence

2.5.1 Provider reimbursement mechanisms

Classical payment methods (salary, capitation, fee-for-service); different governance structures

Many empirical studies in high-income countries have analysed the effects of different provider payment mechanisms on health service delivery. In one systematic⁶ review, Gosden *et al.* 2001 found that primary care physicians paid by fee-for-service delivered more services than those paid through capitation or salary, although the evidence for secondary services was more mixed. The review by Chaix-Couturier *et al.* 2000, more broadly exploring the effects of financial incentives on medical practice, found that capitation-based payment schemes reduced hospital days by up to 80% and prescriptions by 0-24%, as compared with fee-for-service. Further, annual caps on a physician's income increased referrals when this cap was reached.

In both of these reviews, it is unclear whether the higher quantity levels associated with fee-for-service as compared with capitation or salary reflects more complete care and/or induced demand. Therefore the quality effects are not immediately apparent. McGuire 2000 argues that evidence demonstrates physicians are able to induce demand (which negatively affects the quality of care), and sometimes do so for their own materialistic purposes. Bickerdyke *et al.* 2002 reach a similar conclusion, but suggest that evidence shows when demand inducement occurs it is small both in absolute terms and relative to other influences on service provision. The review of Iversen and Luras 2006 posits that evidence shows capitation gives incentives for improved continuity of care and cost containment, but that it may also lead to insufficient care. However, Dudley *et al.* 1998, in a review of the US evidence, found no consistent difference in quality of care between fee-for-service

⁶ All references referred to as "reviews" of evidence in high-income countries were, unless otherwise stated, systematic. That is, they had transparent search strategies with clear inclusion and exclusion criteria.

systems and health maintenance organizations (which typically have prospective or mixed payment mechanisms).

Studies of provider payments in LIC and LMIC settings indicate largely consistent results. Most of this research has compared different forms of payment methods through comparisons of public and private health providers⁷. In such cases, it is not clear whether observed differences are fully attributable to the payment method or also to other aspects of a provider's governance structure (see section 2.4.2).

Exceptions to this includes the work of Yip and Eggleston 2001, 2004, who analysed the switch from fee-for-service to prospective payment in Hainan province, China. They showed that prospective payments reduced hospital spending and patient co-payments on expensive drugs and high technology services, and had slower rates of overall expenditure growth. In the Philippines, Gertler and Solon 2002 found that health providers (both public and private) faced a financial incentive to increase the price-cost margins of insured patients, resulting in providers extracting most of the benefits of insurance. This was explained by providers being reimbursed on a fee-for-service basis, and because benefit packages had first-dollar coverage with low caps, with patients paying the excess.

Evidence based on comparisons of public and private health providers found that provider reimbursement mechanisms influenced the behaviour of health professionals. In New Delhi, India, Das and Hammer 2004, 2005a showed that private doctors, who were paid on a fee-for-service basis, were more susceptible to over-treating patients, as compared with salaried public doctors. However, the authors also found that private doctors were closer to their clinical 'knowledge frontier' than public doctors. They conclude that fee-for-service had a positive

⁷ In high-income countries, a large literature has compared the quality of care provided by health providers with different governance structures (particularly the comparison of for-profit, private not-for-profit and public hospitals), with mixed results. See Eggleston, K., Shen, Y. C., Lau, J., Schmid, C. H. and Chan, J. (2008). "Hospital ownership and quality of care: what explains the different results in the literature?" *Health Econ* 17(12): 1345-62. for a review and explanation of these disparate findings.

impact on quality in terms of reducing under-treatment, but also the potentially negative quality impact of over-treatment, as compared with a fixed salary. In Paraguay, Das and Sohnesen 2007 found that doctors on temporary contracts, female doctors and those working in certain facilities exhibited more effort; doctors with higher salaries exerted less effort. They hypothesised this variation in doctor effort could be explained by differential incentives: doctors with less bargaining power have more to gain financially, and thus face higher-powered financial incentives to provide good quality care.

Research in Tanzania found that clinicians working in nongovernmental organization (NGO) facilities were more likely to correctly diagnose and treat patients than clinicians in government facilities (Leonard *et al.* 2005; Leonard and Masatu 2007). The authors posit this is due to NGO managers having greater discretion over human resources and more financial independence, and perhaps also differences in intrinsic motivation. Similar results were found in Cameroon, in comparisons between government, mission and traditional health providers (Leonard 2003).

Payment methods linked to quality measures

The evidence in high income countries on provider payment methods explicitly related to quality of care (often termed ‘pay-for-performance’) is mixed. In a recent review, Petersen *et al.* 2006 found that 13 of 17 studies had positive effects between financial incentives and process quality measures, though group-level incentives had much smaller effects than bonuses for individual physicians. However, 4 studies showed unintended (perverse) effects, such as providers avoiding severely ill patients, or exhibiting gaming behaviour to increase payment. The authors concluded that financial incentives can improve quality, but cautioned against unequivocal support of such incentives due to these perverse effects, and because the studies evaluated very different incentive strategies and adopted different research methodologies. Reviews limited to randomized trials reached similar conclusions (Dudley *et al.* 2004; Institute of Medicine 2006).

However, Town *et al.* 2005, limiting their analysis to preventive care, found that only one of eight financial interventions led to significantly increased provision of prevention services. This was based on a review of randomized trials. The authors, though, stressed that their finding may reflect the small size of financial rewards offered in these interventions.

Evidence on quality-based payment strategies has also started to emerge in LIC and LMIC settings, although this literature remains limited. Eichler 2006 found that the success of a number of tuberculosis programmes was often hypothesised to be due to the introduction of pay-for-performance schemes. However, these project appraisals were not able to disentangle incentive effects from other programme characteristics. In Haiti, Eichler *et al.* 2001 found that giving bonuses (penalties) if specific performance targets were met (not met) led to positive quality impacts in terms of improved immunization coverage. Evidence from Nicaragua also suggested that performance-based incentives had positive effects, in terms of greater local accountability and autonomy (Jack 2003), although the study did not analyse health service delivery impacts directly. However, the long-term sustainability of these schemes is unknown (McNamara 2005). Further, Liu and Mills 2005 found that whilst bonus payments in Chinese hospitals increased hospital revenue, there were also marked increases in unnecessary care.

Soeters and Griffiths 2003, analysing the contracting out of health services to NGOs in five districts in Cambodia, found that utilization rates for essential primary care services improved in these districts relative to control sites. A key characteristic of NGO districts was changes to provider reimbursement, with doctors receiving performance-based incentives (linked to utilization rates and punctuality bonuses).

In the Philippines, Quimbo *et al.* 2008 found that insurance payments and accreditation had positive quality impacts (as measured by vignettes). This was because they give financial incentives for providers to meet quality standards: health

insurance accreditation is based on external assessment of a provider's quality; insurance payments are not made if healthcare is inappropriate or fraudulent (on the basis of a claims review).

2.5.2 Income-generating strategies

Physicians and other frontline health providers, through their central role in a patient's healthcare, have the opportunity to engage in additional income-generating strategies. Evidence suggests that such activities can adversely affect the quality of health service delivery. As well as the traditional literature on supplier-induced demand (described in section 2.5.1), evidence has shown that health professionals sometimes demand informal fees, pilfer medicines, and alter their prescribing behaviour because of the incentive for financial gain. These incentives can be particularly strong in LIC and LMIC settings, due to health workers' need to cope with inadequate salaries (Van Lerberghe *et al.* 2002).

Physician links with health facilities

Physician dual practice, as discussed in section 2.4.1, has in theory both perverse and desirable incentive effects that can affect the quality of healthcare. However, there is scant empirical evidence related to its impact on health service delivery (Eggleson and Bir 2006; Ferrinho, Van Lerberghe *et al.* 2004; Garcia-Prado and Gonzalez 2007).

There is some empirical evidence on *physician links with ancillary health facilities*, mainly from the US. For example, in the US physicians linked to ancillary private facilities consistently had different referral behaviour, resulting in policy regulations – the Stark laws (see Manchikanti and McMahon 2007 for details) – that severely limited self-referrals. Many studies showed how utilization and profits of facilities providing ancillary and outpatient services in the US were higher if these facilities had financial links with physicians (Lipper *et al.* 1995; Lynk and Longley 2002; Hillman *et al.* 1992; Scott and Mitchell 1994). In Taiwan, researchers analysing outpatient clinics found that the probability of prescription and drug expenditure per

visit were, respectively, 17-34% and 12-36% less amongst visits to clinics without “on-site” pharmacists – pharmacists hired by physicians to dispense the drugs they prescribe (Chou *et al.* 2003). Later studies found that pharmacies linked with physicians accounted for a large and growing proportion of prescriptions in Taiwan (Chen *et al.* 2006; Lee *et al.* 2007).

Dispensing physicians

Other studies have evaluated the prescribing practices of dispensing physicians. A review by Trap 2001 found that dispensing doctors typically prescribed more and/or more expensive medicines than non-dispensing doctors, with negative implications for the cost and technical quality of care. For instance, in Zimbabwe, dispensing doctors were found to deliver lower quality care – in terms of rational drug use and patient safety – than non-dispensing doctors (Trap *et al.* 2002).

More recently, researchers found in South Korea that prescriptions for antibiotics and injections fell following the separation of drug prescribing and dispensing in 2000. However, these were offset by physician demands for compensatory higher medical fees and an increase in prescriptions of high-price drugs (Kim and Prah Ruger 2008; Kwon 2003).

Other coping practices

Misappropriation of medicines occurs in poorly regulated environments and where health professionals have a low public sector income (see, for example, Ferrinho, Omar *et al.* 2004). They contribute to worse quality care by reducing medicine availability in public facilities.

There is also widespread evidence of the existence of informal, or under-the-table, payments in healthcare (see, for instance, Balabanova and McKee 2002; Ensor 2004). However, they do not adversely affect the quality of healthcare directly: their impact is instead on the distribution of healthcare financing. This can, though,

influence who receives better quality care if health providers exert more effort in treating patients who make informal payments.

2.5.3 Incentives and patient characteristics

Financial incentives

A large and diverse literature has shown widespread inequities in many LIC and LMIC health systems (World Bank 2004). Whilst this reflects differential ability-to-pay and other demand-side factors related to the financing of healthcare, it may also be explained in part by health providers facing a financial incentive to discriminate between patients.

Experience with waivers and exemptions from user fees help disentangle the provider incentive effect from demand-side factors. Bitran and Giedion 2003 show that waiver systems which compensate providers for the revenue forgone from granting exemptions have been more successful than those who expect the provider to absorb the cost of exemptions. In the latter system, providers are less willing to implement waivers, because of the financial disincentive to do so.

Evidence on two-tier charging also suggests the importance of provider incentives, since differential ability-to-pay is reflected in part by differential patient charges. In Zambia, McPake *et al.* 2004 found that patients in private wards within public hospitals received more drugs and better access to minor operations than patients in standard public wards. This occurred despite policy stating public and private ward patients should receive healthcare of comparable clinical quality. Comparable findings were reported in Indonesia (Suwandono *et al.* 2001).

Non-financial incentives

Evidence shows that non-financial supply-side incentives are also important, with race, education, socioeconomic status and gender all frequently identified patient characteristics determining the quality of care (Chandler 2008). Much of this research has been qualitative, although some studies have explored this

quantitatively. For example, Sodemann *et al.* 2006 highlighted the importance of sociological incentives in Guinea-Bissau, where acquaintance with a physician was associated with a reduction in 30-day mortality risk by 48%. In Mexico, indigenous women received fewer prenatal procedures than non-indigenous women in private facilities, even after controlling for income and socioeconomic differences (Barber *et al.* 2007). In the US, Street *et al.* 2005 found that better educated patients were more able to influence the healthcare they receive from physicians.

2.6 Summary and some limitations

A substantial literature has analysed how supply-side incentives can affect the behaviour of health workers, and consequently impact on the quantity and technical quality of healthcare patients receive. On the theoretical side, principal-agent models explored how provider payments and monitoring mechanisms can be designed to better align the incentives faced by health providers with patient needs. The new institutional economics literature showed how the incentives faced by health providers are shaped by the institutional environment. Hospital models and analysis of incentives in teams illustrated that an individual doctor's response to incentives are moderated by their interactions with other health providers. Theories of motivation demonstrated the importance of non-financial incentives, and how these can conflict with financial incentives. In terms of empirical evidence, many studies have shown the effects of different provider reimbursement mechanisms on healthcare delivery. Evidence has also found that doctors sometimes engage in additional income-generating strategies (such as dual practice and ownership of ancillary health facilities) because of the incentive for financial gain, and how such strategies can adversely affect healthcare. Other research has shown that health providers sometimes discriminate between patients, and that this may be due in part to financial and non-financial incentives inherent in treating different patients.

The review also highlighted some gaps and unanswered questions in the literature. The research in this thesis seeks to address some of these gaps. For example, whilst the relative importance of various financial and non-financial incentives has been well studied in analysis of the determinants of health worker motivation, there has been little analysis of their relative impacts on actual health service delivery. Similarly, research has typically analysed how doctors facing different incentives can give different healthcare *or* how for one doctor the incentives inherent in treating different patients can lead to differential care, but has rarely combined these two aspects into one analysis.

In terms of the literature on physician links with health facilities, most research has been on the impact of ancillary health facility ownership in the US. But there has been little analysis of this issue in LIC or LMIC settings.

A more conceptual limitation relates to analysis of the relationship between the quantity and quality of healthcare provided. Though well-recognised, this has rarely been studied. The healthcare quality measurement literature focuses on whether health providers have done everything necessary to give good quality care, whereas the efficiency literature focuses on wasteful or unnecessary care, but neither analyse the relative importance of insufficient as compared with unnecessary care.

In the next chapter, the methods used in this thesis to address some of these limitations are described. These include the theoretical and empirical approaches of the thesis, which form the basis for the subsequent results chapters.

Chapter 3: Methods

The fundamental premise underpinning this study, that the healthcare a patient receives depends in part upon the incentives a doctor faces, was made in the introductory chapter. The literature review in chapter 2 expanded on how the incentive structure can have a profound effect on the quality of health service delivery. In this chapter, the research aims and objectives of the thesis are first specified. Then a conceptual framework and associated empirical methodology are developed. The conceptual framework builds on findings from the reviewed literature to highlight how different incentives can influence the healthcare doctors give to patients, and proposes a number of hypotheses. Empirical methods for testing these hypotheses and other theoretical insights emerging from the conceptual framework are then outlined. This includes a description of the data used. Discussion of the limitations of the methodological approach is reserved for the concluding chapter of the thesis.

3.1 Research aim and objectives

The aim of this thesis is to analyse how the incentives faced by doctors in a lower-middle income country setting influence the quality of healthcare a patient receives.

Specific objectives are to:

1. Explore the conceptual and empirical relationship between the quantity and quality of healthcare;
2. Analyse the impact of supply-side incentives on the quantity and quality of healthcare received by public hospital inpatients;
3. Assess if doctors unduly influence patients' use and expenditure in ancillary health facilities with which they have financial links;
4. Use the empirical results to inform discussion of incentive-related health policy reforms.

3.2 Conceptual Framework

3.2.1 Rationale for the approach

To understand how incentives affect the quality of health service delivery, this conceptual framework uses a simple application of the principal-agent model to analyse the doctor-patient relationship. It draws from the theoretical literature analysing incentives in healthcare. Of particular relevance are applications of the principal-agent model to healthcare (key references include: Chalkley and Malcomson 2000; McGuire 2000; McPake *et al.* 2007) and the role of non-financial factors in motivating health workers (key references include: Fehr and Falk 2002; Franco, Bennett *et al.* 2002). These and other articles were reviewed in section 2.4 of the last chapter.

Although the principal-agent model has highly restrictive assumptions, it is chosen as the basis for this conceptual framework because it provides a robust foundation from which incentives can be analysed. Indeed, the main aim of the conceptual framework is to explore the problems arising in incentive design when these assumptions are relaxed, such as patients paying different amounts for healthcare and allowing for referrals. It also includes incorporating theories of motivation (and related empirical findings) to rationalise non-financial incentives within the principal-agent model.

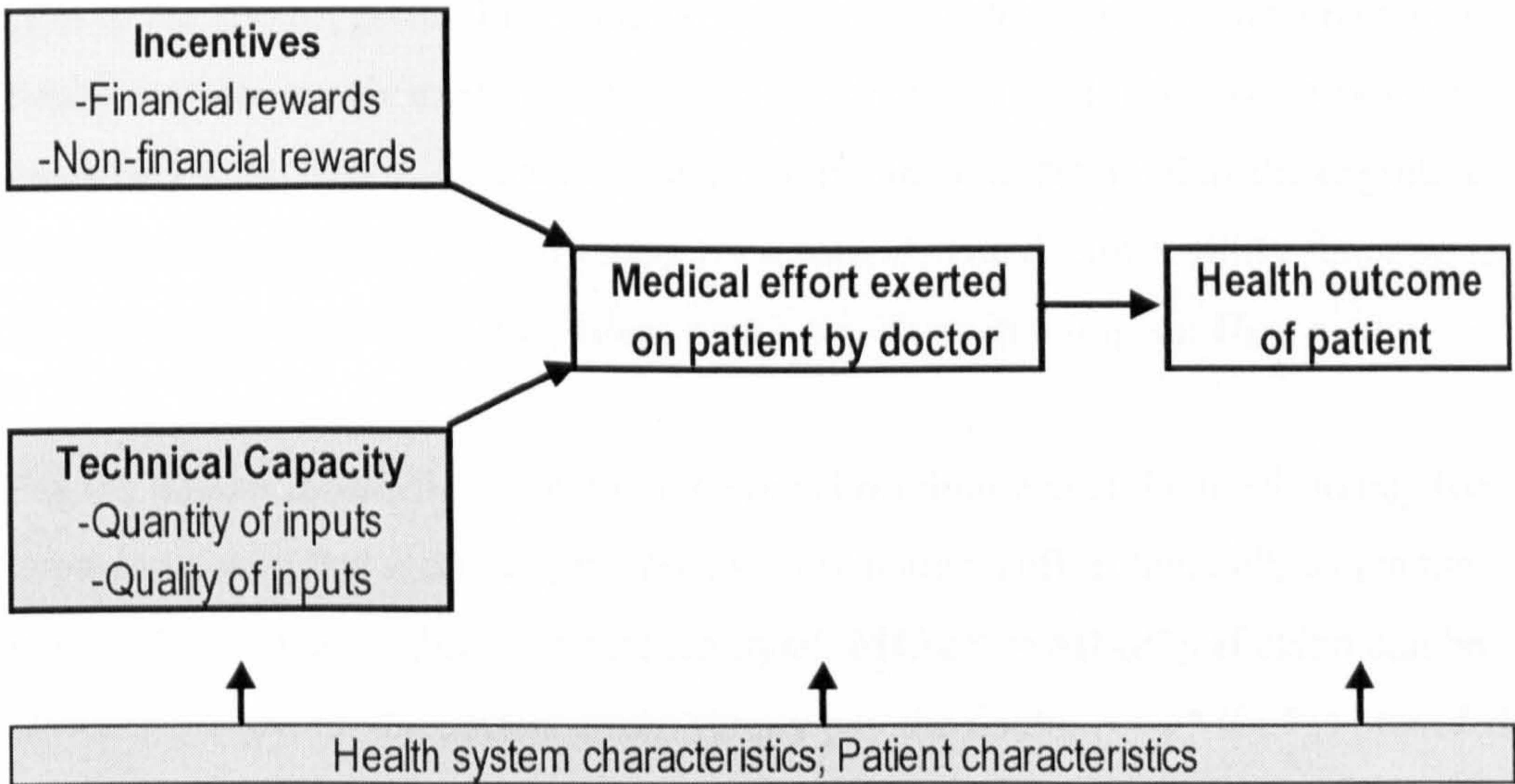
To keep the model parsimonious, the focus of the conceptual framework is on the doctor-patient interaction. This has the advantage of making hypotheses more straightforward and therefore easier to test empirically. But it does mean that there is only limited analysis of how group dynamics within a health system can affect an individual doctor's response to incentives (as shown by models of hospital behaviour and analysis of incentives in teams). Further, the conceptual framework does not analyse how institutions affect incentives. This does not present a major limitation here, given that the empirical chapters predominantly analyse doctors

working within similar governance structures (see section 2.4.2 for a review of the relevance of this literature to healthcare).

3.2.2 Incentives, medical effort and quality

Incentives have an effect on a patient’s health outcome through their impact on the amount of medical effort a doctor (or other health worker) exerts on a patient, as illustrated in Figure 3.1. This effort is not only the medical equipment and drugs used in caring for a patient, but also the thought given by a doctor to the patient’s diagnosis and treatment. That is, medical effort is defined here as the cognitive and physical activities that are required in caring for a patient. This is consistent with standard dictionary definitions of effort⁸.

Figure 3.1: The effect of incentives on the healthcare a patient receives



Medical effort, though, can only have a positive impact on a patient’s health if it is of good technical quality. Indeed, whilst more effort is generally expected to improve or at least not worsen a patient’s health, too much physical effort can in some cases actually be harmful to the patient. For instance, prescribing a patient

⁸ For example, *physical or mental exertion* (Collins Dictionary); the *physical or mental activity needed to achieve something* (Cambridge Dictionary); *strenuous physical or mental exertion* (Oxford Dictionary).

medication that is not required could have a detrimental effect on the patient's health. Incentives to increase effort therefore may not always be health improving. Indeed, the supplier-induced demand literature (see sections 2.4 and 2.5) shows that doctors sometimes induce demand for healthcare, even though this care is not clinically needed. The relationship between medical effort and quality of care is explored in the first empirical results chapter.

3.2.3 A simple application of the principal-agent model

Model setup

Consider a single patient (principal) – doctor (agent) interaction, where each is fully informed about each other's behaviour. Further, assume initially that the reward a doctor receives from treating a patient is limited to explicit financial rewards. The patient wants to improve his health outcome h at minimum cost: the reward r that is paid to the doctor, giving him a utility function: $U_p = h - r$. Improving a patient's health requires costly medical effort from the doctor: $h = f(e)$, with e assumed to be positively related to h . As stated earlier, effort can be understood as the cognitive and physical effort required in caring for a patient. The doctor's utility function is the reward received from the patient minus the effort in doing so: $U_d = r - e$.

For the patient to maximise health outcome at minimum cost, he needs to pay the doctor in a way that motivates the doctor to provide an effort level e^* , where the marginal cost and product of effort are equal: $MC(e^*) = MP(e^*)$. If effort can be perfectly observed, the patient could simply pay the doctor $r = e^*$ if e^* is provided, and zero otherwise. This represents an effort dependent contract, with the penalty of no payment if effort level e^* is not met. Similarly, government/insurers paying the doctor on behalf of the patient could pay a wage per unit of effort equal to the marginal product of the doctor at e^* : $r = w \times e$, where $w = MP(e^*)$. This represents a wage contract that perfectly reflects a doctor's performance. In both cases, payments have high-powered financial incentives encouraging e^* . More generally, payment methods need to be linked to e^* to encourage an appropriate level of effort.

The remainder of this section analyses the implications for incentive design when assumptions inherent in this initial model setup are relaxed. In particular, sub-section [A] addresses asymmetric information; [B] explores the consequences of heterogeneous patients; [C] discusses the importance of various non-financial factors; [D] and [E] allow for multiple principals and multiple agents respectively; and [F] incorporates the possibility of referrals into the analysis.

[A] *Payment methods under asymmetric information*

Unless the effort a doctor exerts can be perfectly observed by the patient (or government / insurers), payment methods linked to e^* are not feasible. Complicating incentive design further is the difficulty in gauging the extent to which improvements in a patient's health are attributable to a doctor's effort. These characteristics of healthcare are well-established (see, for example, Chalkley and Malcomson 2000).

Alternatives to payments linked to e^* can be grouped into payments that are retrospective and those that are prospective. Salaries and prospective payment systems (capitation and budgets) are expected to lead to under-effort, since they are not directly linked to effort exerted on a patient. That is, in each of these payment types, there is no direct financial incentive to exert effort on a patient, other than the risk of the patient seeking care from other doctors in the future (or the doctor losing their job within a health facility). In this sense, they have low-powered financial incentives.

Conversely, commonly used retrospective payments (fee-for-service and many performance-based payments) have high-powered financial incentives. They encourage higher levels of effort, but only in the effort proxies for which a doctor is reimbursed. For example, in fee-for-service reimbursement, the doctor will be prone to providing too many reimbursed services (i.e. the marginal cost of providing these services being higher than their marginal benefit), at the expense of the less measurable aspects of healthcare that are not reimbursed. Similar incentives hold

true for many performance-based payments. For instance, financially penalising a doctor for not meeting quality standards (or equivalently, paying a bonus for meeting such standards) only encourages more appropriate effort if these standards are an accurate indicator of good quality care. In other words, more effort as measured by any of these proxies is only desirable when effort proxies are well correlated with e^* .

In summary, doctors paid retrospectively will exert more observable effort than doctors paid prospectively. However, retrospective payments will only encourage an appropriate effort level if payments are well correlated with e^* . Consequently, it is therefore not evident whether prospective or retrospective payment systems should be preferred⁹.

[B] *Heterogeneous patients*

When the model is extended to multiple patients, and if the amount paid by (or on behalf of) patients to a doctor varies across patients, then doctors have a financial incentive to exert more effort on patients paying more. This incentive is accentuated if the doctor has significant time and other resource constraints.

To illustrate, a doctor treats 2 patients. Patient 1 is able and/or willing to pay r_1 , whereas patient 2 is only able and/or willing to pay r_2 , where $r_1 > r_2$. If the doctor exerts the same effort on each patient ($e_1 = e_2$), then she derives more utility from treating patient 1. That is, $[r_1 - e_1] > [r_2 - e_2]$ where $r_1 > r_2$ and $e_1 = e_2$. She will only be indifferent between treating these two patients when $[r_1 - e_1] = [r_2 - e_2]$. Given $r_1 > r_2$, this can only be when $e_1 > e_2$, that is when she exerts more effort on the patient who pays her more. This shows that more effort will be exerted on patients from

⁹ The New Institutional Economics literature (see section 2.4.2) would suggest that payment methods with lower-powered incentives are preferable if the transaction between patient and doctor is complex, with the converse holding true for high-powered incentives. Given that effort cannot be easily observed, and that a patient's health outcome occurs after a time lag, with improvements not necessarily attributable to the doctor, many patient-doctor interactions can be interpreted as complex. However, new institutional economics says little about a doctor's expected behaviour, the focal point of this study. Instead, it is more appropriate instead for comparisons of the relative virtues of different governance structures.

whom a doctor receives a higher financial reward. Thus although differential pricing benefits poorer patients financially, there is a risk that it disadvantages them in terms of the amount of medical effort exerted.

[C] *Non-financial factors*

As discussed in the literature review, doctors are not only motivated by financial concerns. Professionalism and concern for a patient's well-being moderate a doctor's response to financial incentives. More precisely, the extent to which a doctor responds to financial incentives depends on the relative weight s/he places on personal financial gain vis-à-vis a patient's well-being, assuming these two objectives are not aligned.

Nevertheless, non-financial factors may still enter into a doctor's decision to discriminate among patients in their application of effort. Specifically, if non-financial rewards differ amongst patients, then doctors will exert more effort on patients from whom they receive a higher non-financial reward. This is for the same rationale as described above for differences in the amount paid by patients. Reasons for variation in non-financial reward among patients include doctors expecting higher reciprocal gains from some patients compared with others, or because doctors perceive certain patients to be more in need or more deserving of healthcare (see, for example, Fehr and Falk 2002).

Patients may also differ in their ability to advocate for more effort from a doctor (as shown, for instance, by Street *et al.* 2005). For example, some patients may be more knowledgeable about appropriate care, and thus better at influencing the doctor to provide this (independently of the financial reward paid to a doctor). More generally, information-related policies, such as performance monitoring and feedback, can improve the identification of effort. When linked to financial or non-financial rewards (or penalties), they can be used to encourage doctors to provide effort levels closer to e^* for all patients.

In summary, non-financial factors imply that more effort will be exerted on patients that a doctor receives a higher non-financial reward from, and on patients who are better able to advocate for more care. Such effects, though, will be moderated if doctors are effectively monitored, and by a doctor's concern for a patient's well-being, both of which will encourage a doctor to provide a more appropriate effort level.

[D] *Multiple principals*

Secondary principals (government or insurers) often pay in part for a patient's healthcare, particularly within public health facilities. Within this conceptual framework, whether the patient pays directly or a secondary principal pays on behalf of the patient, the incentives a doctor faces are conceptually identical. That is, a doctor's utility function remains as $U_d = r - e$, whoever pays the doctor reward r . Further, the objectives of the patient and secondary principal are aligned in the sense that they both want to improve the patient's health at minimum cost.

However, the health insurance literature demonstrates that insured patients with comprehensive coverage (i.e. zero or low co-payments) have little incentive to contain healthcare costs once they fall sick, since insurance will reimburse their healthcare costs. This is referred to as *ex post moral hazard* (see Cutler and Zeckhauser 2000 for a detailed discussion of moral hazard in health insurance). Within this model, it means that the negative value of r in an insured patient's utility function is less than the positive value of r in a doctor's utility function. Coupled with the insured typically being able to pay more for healthcare than the non-insured in low-middle income countries, doctors therefore face an incentive to exert more effort on insured patients.

[E] *Multiple agents*

A doctor's response to incentives is the focus of this study. However, doctors are only one of multiple agents responsible for the healthcare a patient receives. Whilst all health workers can be described as having the same general utility function, the

value and components of r and e in treating a patient may vary across different agents. Of most relevance here is how the incentives faced by doctors responsible for the patient's treatment plan may conflict with incentives at the hospital (or other health facility) management level. For instance, if a doctor receives a flat annual salary, then the incentive to exert more effort on patients paying more only exists at the hospital management level. Similarly, the incentive to contain healthcare costs is stronger at the hospital management level than the individual doctor level.

Such differences matter because doctors, as a frontline provider, have significant discretion in how health services are ultimately delivered (Lipsky 1980). Whether a doctor is affected by hospital-level incentives thus depends on how able hospital management is to influence the doctor's behaviour. This occurs when hospital management level and doctor level incentives are aligned. In relation to differential patient charges, incentives are aligned when doctors receive a share of these revenues. For cost containment, there is greater incentive alignment when doctors are held accountable for their input use.

[F] *Referrals*

As well as healthcare provided within a health facility, patients may need to be referred to ancillary health facilities for additional healthcare. For example, a patient may need to visit a pharmacy if prescribed drugs are not available within the doctor's health facility. Similarly, a patient may have to go to a diagnostic clinic if the doctor's health facility does not have the medical equipment to undertake the required diagnostic tests. A doctor, as the patient's agent, is responsible for such referral decisions. If the doctor has no connection with these external health facilities, then her utility is unaffected by the facility to which she refers the patient.

In contrast, if a doctor owns or has financial links with an external ancillary health facility, then she has a financial incentive to refer patients to such facilities. In the case of pharmacy ownership, it creates a perverse financial incentive to over-prescribe. If the doctor owns a diagnostic clinic, the perverse incentive is for the

physician to recommend tests that are not medically necessary. In both cases, patients are therefore likely to spend more on healthcare than they strictly need to. By this, it means that the marginal benefit of this healthcare is less than its marginal cost. These perverse incentives are more marked when patients pay directly for drugs themselves or when drugs are retrospectively reimbursed by insurers on a fee-for-service basis (as compared with prospective drug reimbursement), since financial gain is then directly linked to prescribing and referral strategies.

In summary, this theoretical framework demonstrates that doctors face financial and non-financial incentives to discriminate between patients, irrespective of actual health need. It also shows that a doctor's referral behaviour is affected by potential financial gain, and more generally that doctors respond to the method in which they are paid. Effective monitoring, and better informed patients, can encourage doctors to provide more appropriate healthcare. These theoretical insights are based on the impact incentives have on the amount of medical effort a doctor exerts on a patient, with the impact of incentives on a patient's health outcome depending on the technical quality of this medical effort.

From this conceptual framework, 11 hypotheses are proposed (with the section from which the hypothesis is derived in square brackets). The following 8 hypotheses are empirically tested:

1. Retrospective payments only encourage an appropriate effort level if payments are well correlated with e^* [A].
2. More effort will be exerted on patients that a doctor receives a higher financial reward from [B].
3. More effort will be exerted on patients from whom a doctor receives a higher non-financial reward [C].
4. More effort will be exerted on patients who are better able to advocate for more care [C].
5. Doctors that are effectively monitored will provide a more appropriate effort level [C].

6. More effort will be exerted on the insured than the non-insured (independent of the reward a doctor receives from a patient) [D].
7. Doctors owning (or having financial links with) external ancillary health facilities will refer patients to such facilities [F].
8. Patients referred to doctor-owned ancillary facilities will spend more on healthcare than they need to [F].

A further 3 hypotheses are not empirically tested, due to data constraints:

9. Doctors paid retrospectively will exert more observable effort than doctors paid prospectively [A].
10. Concern for a patient's well-being moderates the impact of financial incentives [C].
11. Incentives at the health facility level will have less effect on individual doctors if these doctors face different incentives [E].

3.3 Overview of empirical methodology

In this section, the empirical methods used to test the theoretical insights of the conceptual framework are introduced. Subsequently, details of the data used are described, including study site characteristics, sampling strategies and methods of data collection. Note that the econometric models used in the empirical analysis are discussed in detail in each of the three results chapters (chapters 5, 6 and 7).

3.3.1 Links with conceptual framework and research objectives

The conceptual framework, building on an extensive literature, analysed the impact of incentives on health service delivery. It demonstrated how incentives can influence the amount of medical effort a doctor exerts on a patient, and through this effect, alters the quality of healthcare a patient receives. A variety of empirical methods are used to test these theoretical insights, with data coming from both primary and secondary sources. Table 3.1 illustrates how these empirical approaches correspond to the overall objectives of the thesis and the conceptual framework.

Table 3.1 Empirical methods, conceptual framework and research objectives

Research objective	Key insights from conceptual framework	Summary of empirical approach	Relation to hypotheses
1. To explore the conceptual and empirical relationship between medical effort and the quality of health care.	Incentives influence the quality of healthcare a patient receives through their impact on the amount of medical effort a doctor exerts on a patient	Disaggregated clinical vignettes assess the extent, consequences and determinants of insufficient and unnecessary care (results part 1: chapter 5).	Provides a quality perspective on medical effort for the hypothesis testing of subsequent empirical chapters on the effect of incentives on effort.
2. To analyse the impact of supply-side incentives on the quantity and quality of healthcare received by public hospital inpatients.	Doctors face financial and non-financial incentives to discriminate between patients, irrespective of actual health need. Monitoring and information-related policies can encourage doctors to provide more appropriate healthcare.	Regression models analyse the effect of financial and non-financial incentives, plus the role of monitoring and information, on the volume and type of health services a hospital inpatient receives (results part 2: chapter 6).	Tests hypotheses 1-6.
3. To assess whether doctors unduly influence patients' use and expenditure in ancillary health facilities with which they have financial links.	A doctor's referral behaviour to external ancillary health facilities is affected by the potential for personal financial gain.	Regression models assess whether physicians with familial links to a private pharmacy persuade patients to use their pharmacy. Regressions on actual expenditure, and simulations of potential generic expenditures, assess if such patients are spending more on medicines than they need to (results part 3: chapter 7).	Tests hypotheses 7-8.

Note: all three stages of empirical analysis contribute to the final objective (to evaluate the implications of the empirical insights for health policy reform, particularly for policies designed to improve health service delivery for the poor). This objective is the focus of the final discussion chapter of the PhD.

3.3.2 Data

Secondary data were used to address the first and second research objectives.

Primary data were used to evaluate the third research objective.

SECONDARY DATA

The following description of secondary data that was used for the thesis draws heavily from project documents. Unless stated, facts and figures in this section are from Peabody, Solon *et al.* 2004; Peabody and Solon 2003; or Shimkhada *et al.* 2008.

Secondary data came from the Philippine Child Health Experiment, known locally as QIDS (Quality Improvement Demonstration Study). This large-scale study, covering thirty districts in the Philippines, explored the impact of policy interventions on provider behaviour and access to healthcare for children aged five years or under. As part of the QIDS study, facility, patient exit, physician (including clinical vignettes) and household surveys were conducted, although household survey data were not used in this thesis. Facility and patient exit surveys were collected exclusively in district hospitals; physician data in district hospitals and private clinics. The secondary data were used for the first two empirical results chapters (chapters 5 and 6).

Study site characteristics

The QIDS study randomly sampled 30 districts in the Visayan island group and the northern tip of Mindanao. Study districts are marked on the map in Figure 3.2. The focal point of each study district was its public hospital. These were typically located in the district's main commercial centre, usually a municipality or small city (hereafter referred to collectively as a town).

Study districts were situated within one of 11 provinces, which in turn were located in one of regions 6, 7, 8 and 10 of the country (the Philippines has in total seventeen administrative regions). Table 3.2 shows that per capita incomes in the study regions

were close to or below the national average and much lower than in Metro Manila (the National Capital Region). Similarly, the percentage of families living below the national poverty threshold (defined as food plus non-food basic needs) was higher than the national average in all study regions.

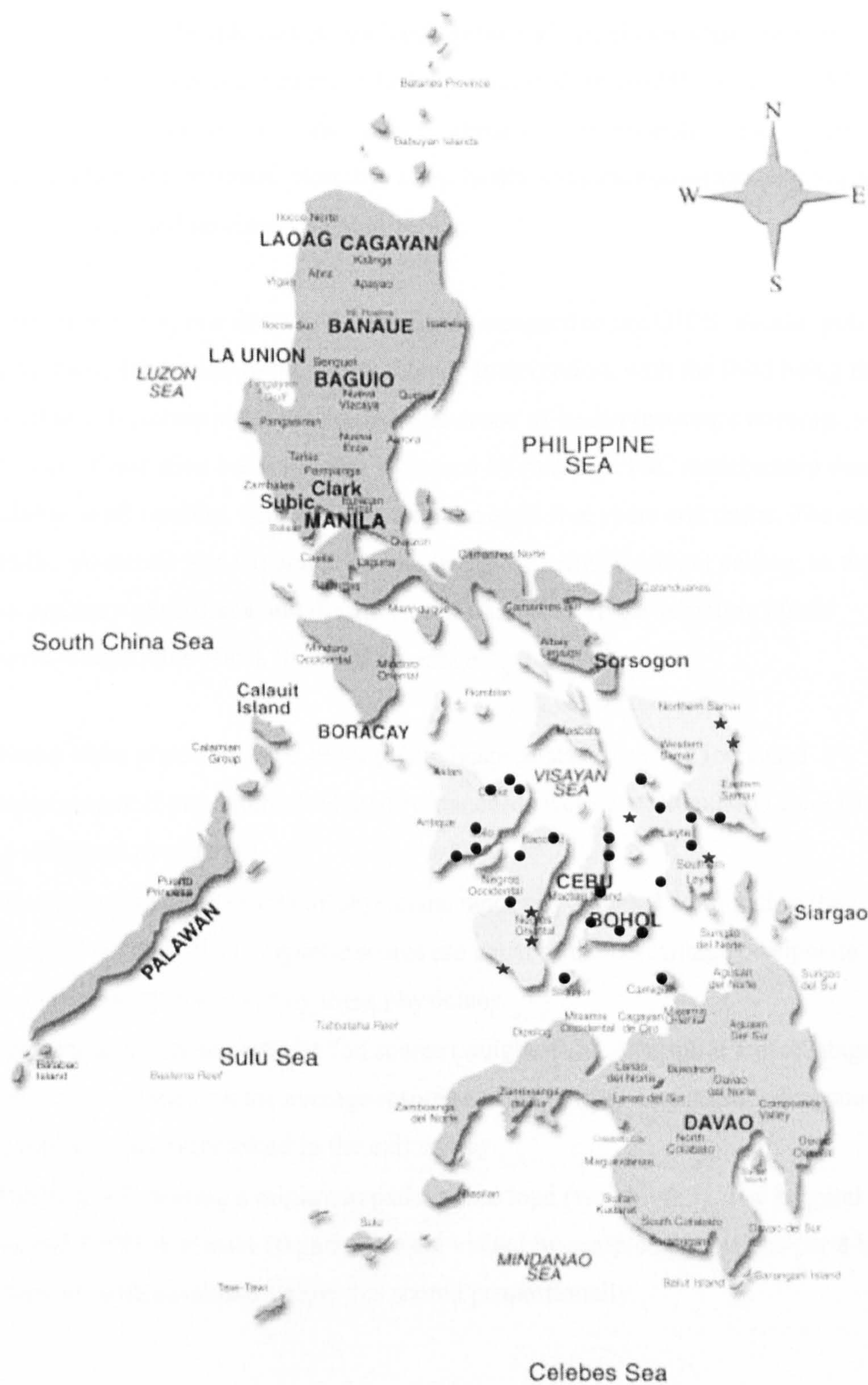
Table 3.2: Income and poverty incidence in the study area

	GDP per capita index (national average=100), 2007 ⁱ	Poverty incidence of families, 2006 ⁱⁱ
Philippines (national average)	100	26.9%
National Capital Region	261	7.1%
Region 6	90	31.1%
Region 7	96	30.3%
Region 8	45	40.7%
Region 10	107	36.1%

ⁱ National Statistical Coordination Board <http://www.nscb.gov.ph/grdp/2007/2007concap.asp>

ⁱⁱ Family Income and Expenditure Survey (2000).

Figure 3.2: Map of the Philippines with study areas highlighted



Key: ★= primary data subset; ●= remainder of secondary data sites

QIDS policy interventions and their assignment to study districts

The 30 study sites were matched into blocks of three districts, each block being similar in terms of health system, socioeconomic and population characteristics. More precisely, each matched block had a similar (within 10-25% of the block's average) population size, average income, labour force participation rate, functional literacy, infant and maternal mortality rates, health insurance coverage, rural-urban population mix and proximity to Manila.

Within each block, one district was randomly assigned to the QIDS 'access' policy intervention, the second to the QIDS 'bonus' intervention, with the third being the control site. In access sites, the breadth and scope of health insurance coverage was expanded. Population coverage was increased by making PHIC membership freely available to all families with indigent children aged five years and under. The scope of PHIC insurance was expanded by increasing the reimbursement ceiling, so that most ordinary pneumonia and diarrhoea cases treated at a participating public hospital would have 100% financial coverage.

In bonus sites, physicians and other public hospital staff received increased reimbursement if pre-determined quality standards were met. Standards were based on a weighted average of:

- The clinical vignette scores of physicians randomly selected from within the hospital (weight=0.7). Vignette scores are equal to the percentage of vignette items correctly answered by these physicians.
- Hospital-level patient satisfaction scores (weight=0.1). A hospital's percentage scores were based on the average response of patients to 18 patient satisfaction questions they were asked in the exit survey.
- The hospital meeting a minimum patient case load (weight=0.2). The hospital scored 100% if at least 10 patients were visited by sampled physicians per 8 hours worked, with caseloads below this scored proportionally.

A qualification threshold was set ex ante twice yearly by the QIDS study team, so that approximately half of the physicians would be expected to qualify for a bonus. If this threshold was met, half of the bonus payment went to physicians, with the other half distributed amongst the remaining hospital staff.

Table 3.3 describes the distribution of public hospitals across the 30 study districts to the access and bonus policy interventions.

Table 3.3 Public hospitals and policy interventions

Province	Public Hospital	Intervention
Capiz	Roxas Memorial Provincial Hospital	Access
	Mambusao District Hospital	Bonus
	Bailan District Hospital	Control
Iloilo	Pedro Trono Memorial Provincial Hospital	Access
	Ramon Tabiana Memorial District Hospital	Bonus
	Dr. Ricardo Y. Ladrido Memorial District Hospital	Control
Negros Occidental	Valladolid District Hospital	Access
	Kabankalan District Hospital	Bonus
	Alfredo Maranon Sr. Memorial Hospital	Control
Bohol	Teodoro P. Galagar Memorial Hospital	Access
	Cong. Simeon Toribio Memorial Hospital	Bonus
	Cong. Natalio P. Castillo Memorial Hospital	Control
Cebu	Danao District Hospital	Access
	Lapu-lapu District Hospital	Bonus
	Severo Verallo Memorial Hospital	Control
Negros Oriental	Bais District Hospital	Access
	Gov. William Villegas Memorial Hospital	Bonus
	Bayawan District Hospital	Control
Island Triplet (Biliran, Camiguin & Siquijor)	Biliran Provincial Hospital	Access
	Camiguin Island General Hospital	Bonus
	Siquijor Provincial Hospital	Control
Leyte	Leyte Provincial Hospital	Access
	Carigara District Hospital	Bonus
	Hilongos District Hospital	Control
	Dr. Manuel B. Veloso Memorial Hospital	Access
	Abuyog District Hospital	Bonus
	Burauen District Hospital	Control
Eastern Samar	Taft District Hospital	Access
	Albino M. Duran Memorial Hospital	Bonus
	Oras District Hospital	Control

Note: based on table from the QIDS Implementation Manual.

QIDS surveys used

Each of the QIDS surveys was conducted twice, in two distinct time periods (November 2003-December 2004, and September 2006-June 2007). The first time period was a pre-intervention baseline study; the second time period reflected a post-intervention study.

The QIDS surveys were developed in conjunction with the Philippine Department of Health, and were based on previously validated survey instruments used in other country settings. Each survey was pre-tested in pilot locations separate to the study sites but with similar socioeconomic and health system characteristics. Data collectors received extensive training on survey methods. All interviews were conducted in the local dialect, although questionnaires were printed in English (other than the consent portion, which was written in both English and the local dialect). The QIDS surveys used in this thesis are described below, and can be found in the appendix.

For the *patient exit survey*, the sample comprised inpatient cases of children aged five years or less. The child's mother (or other carer) was interviewed immediately after the child was discharged. The relevant questions for this research were those related to the child's admission, the child's health status and their household's socioeconomic status. In each of the 30 hospitals, interviews were conducted for at least 30 children with pneumonia, 30 with diarrhoea and 30 with other illnesses. These were identified from a hospital's daily activity reports, with the mother (or other carer) of all children with a final diagnosis of pneumonia or diarrhoea sequentially interviewed until the sample size of 30 was achieved.

The *facility survey* was undertaken in all 30 hospitals, with the relevant questions for this thesis being related to the availability of essential medical inputs and the hospital's case load. The hospital director or senior administrative officer completed this survey.

For the *physician survey*, a list of public and private clinicians was collected for the catchment areas of all 30 hospitals (the following sampling information for the physician survey comes from Quimbo *et al.* 2008). For inclusion in the study sample frame, physicians needed to be graduates of an accredited medical school. Public physicians had to work full-time in public hospitals; private physicians had to live in the same district as the public hospital and serve the same geographic population. Although doctors were not required to be paediatricians, children had to account for a significant amount of their practice. For doctors who met these conditions, three randomly selected public physicians per public hospital, and two randomly selected private doctors were interviewed in each of the 30 study districts. Clinical vignettes on paediatric pneumonia, diarrhoea and dermatological cases were administered to these doctors. Questions on their clinical experience and training were also asked.

PRIMARY DATA

Primary data were collected from seven of the thirty QIDS study districts. These were pharmacy customer exit surveys, conducted after a customer had just purchased medication from a private pharmacy. This survey was used for the third results chapter (chapter 7).

Sample frame

Six districts were purposively selected from among the thirty districts used in the QIDS study. District selection was based on:

- The district having at least one pharmacy in the district’s main commercial centre owned by a public hospital physician
- Representation of each QIDS intervention type – access and bonus policy interventions, as well as control sites.

A seventh district (Palompon) was added because in one of the districts (Bais) the pharmacy owned by a public hospital physician was closed throughout the study period. The selected districts are located in Regions 7 and 8 of the Philippines (the

QIDS study was conducted in Regions 6, 7, 8 and 10). In each district, the research was conducted in its main commercial centre.

The selected sites have similar health system infrastructure, although the income per capita in Region 8 is less than half of that in Region 7 (see Table 3.4). For each site, all pharmacies within a 30 minute walk of the town’s public district hospital were included in the sampling frame, giving a total of 46 pharmacies.

Table 3.4: Health infrastructure in study sites

District	Region	QIDS type	Health system infrastructure		Closest tertiary hospital
			# Pharmacies	# Private Clinics	
Bais	7	Access	7	2	1 hour / 45 km
Guilhulgnan	7	Bonus	5	2	3.5 hours / 117km
Bayawan	7	Control	11	6	2.5 hours / 102km
Palompon	8	Access	6	1	3.5 hours / 140km
Taft	8	Access	4	2	2 hours / 49km
Abuyog	8	Bonus	7	2	1 hour / 58km
Oras	8	Control	6	2	4 hours / 85km

Sample selection

To select the sample of pharmacies for the exit survey, a screening interview was administered with the pharmacy owner and/or chief pharmacist (see the appendix for the topic guide used for these interviews). The interview was conducted in English, with a translator present to assist on demand. The screening interview provided information on the pharmacy’s ownership and location. The screening interview was administered to 39 of the 46 pharmacies. Of the 7 pharmacies not available for screening, 3 refused to be interviewed (all independently owned), and 4 more pharmacies were closed throughout the study period (two independently owned; two owned by, or with familial links to, public hospital physicians).

Consequently, the following pharmacy types were chosen for the pharmacy exit surveys:

- All pharmacies owned by, or with direct familial links (parent, sibling or offspring) to, a public hospital physician.

- All pharmacies owned by, or with direct familial links to¹⁰, a private clinic physician.
- All pharmacies located next to the hospital (i.e. on the same street and within a two minutes' walk).
- Controls of two or more randomly selected independent pharmacies per site. An independent pharmacy is defined as: a pharmacy that is *not* owned by, nor has direct familial links with, a public or private physician.

This gave a sample of 29 from a total of 46 pharmacies, of which 39 were available for the screening interview.

The screening interview also enabled data to be collected on the price and availability of certain essential medicines. This was done in 35 of the 39 pharmacies that took part in the screening interview. Three of the four pharmacies that did not provide data on medicine price and availability were independently owned; one had familial links with a public hospital physician. Medicine price and availability data were also collected in the public hospital pharmacies in each of the seven sites.

Data collection

Data collection took place over the four month period of March-May 2007 (March 2007 in Region 7 districts, followed by mid-April to end of May in Region 8 districts). Exit surveys of pharmacy customers were chosen in preference to the alternative of interviewing patients directly after physician consultations. This was because in the latter, purchasing intentions may not reflect reality, the interview may bias a patient's subsequent purchasing behaviour, and no analysis of over-the-counter purchases is possible.

Sample size calculations were made to determine minimum sample requirements. The fundamental statistical question driving this was the expected difference in the

¹⁰ The terms 'owned by', with 'familial links' to, or 'linked with', a physician, are used interchangeably from this point on.

proportion of referrals from a public district hospital to: (1) public physician owned pharmacies, and (2) independent pharmacies. There were no data available on this in the literature, so piloting of the exit survey was done in a district with a similar health infrastructure and socioeconomic characteristics (but located much closer to the capital city, Manila, for logistical reasons).

From this piloting exercise, the expected proportion of users referred from the local public district hospital was estimated to be one-third for public physician owned and one-sixth for independent pharmacies. Given a significance level of 95% (two-sided) and a study power of 90%, this yielded a required sample size of 92 pharmacy customers in public physician owned pharmacies and 268 for independent pharmacies. Data clustering is likely, but there is no prior information from other studies in the literature to estimate what the design effect would be. Clustering was therefore controlled for in the analysis, with the potential risk that models would not have sufficient power.

The actual sample size was 358 and 992 pharmacy customers for public physician owned and independent pharmacies respectively, with data pooled across the 7 district study sites. Such a large sample (relative to sample size calculations) was used for opportunistic reasons as well as likely data clustering: there were high fixed costs of reaching pharmacies in the sample, so as many pharmacy customers as possible were interviewed during field visits.

A cross-sectional study design was used, with respondents interviewed immediately after purchasing medicines from a pharmacy. They were asked if they received a prescription, and if so, from whom, what they bought, and questions related to their socioeconomic status (see appendix for the questionnaire used). 40-60 customers were interviewed per pharmacy, with a minimum timeframe of one day per pharmacy. In each pharmacy, all customers purchasing any kind of medication were interviewed. Interviewing was sequential. At busy times this meant some pharmacy customers left before they could be interviewed.

The pharmacy exit surveys were conducted by six local research assistants. All had previously undertaken hospital exit surveys in the district/s they were assigned to as part of the QIDS study, and consequently had received substantial training on survey methods. Additional training was given, explaining to the assistants the purpose of this study as well as a step-by-step explanation and practice run of the actual exit survey. The data collectors interviewed pharmacy customers in the local dialect (Cebuano for Region 7, and Waray-Waray for Region 8), although questionnaires were printed in English (other than the consent portion, which was written in both English and the local dialect). Standardised translations into the local dialect were provided to the data collectors to ensure uniform interpretation of English words.

During the screening interview, pharmacy owners were told that their pharmacy *may* be selected for these exit surveys, and that if they were to be conducted at their pharmacy, this would be done sometime within the two weeks following the screening interview. Pharmacy owners were not informed beforehand of the exact day/s of interview.

Data collected were entered twice by two different people. Checks for errors in data entry were done using the computer programme Epi Info, version 3 (<http://www.cdc.gov/epiinfo/>). This programme highlighted any discrepancies between the two data entrants. Such discrepancies were then checked against the hard copies of the completed questionnaires, and any errors corrected.

3.3.3 Impact of funding on the research

Funding for the thesis came from a joint interdisciplinary studentship from the Economic and Social Council and the Medical Research Council. After being offered the studentship, no conditions on the content of the thesis were imposed. Nevertheless, the nature of this funding influenced the topic of the thesis, since funding was only available to PhD theses that cross the social science and medical

disciplines. Indeed, a requirement of the studentship was that the PhD candidate should have one social science and one clinical supervisor.

3.3.4 Ethical considerations and permissions; obtaining data

Ethical approval and government permissions were obtained for both primary and secondary data. For primary data, ethics approval was obtained from the University of the Philippines and the London School of Hygiene and Tropical Medicine. For secondary data, ethics approval was obtained from the University of the Philippines and the University of California San Francisco.

For both primary and secondary data, permissions to undertake the research were first given by the Department of Health. Subsequently, for each study site, approval from the mayor's office was acquired before conducting data collection. In all data collection methods, participation was entirely voluntary and anonymity was guaranteed. Permission to use the secondary data was obtained from the principal investigators of the QIDS study (John Peabody and Orville Solon).

3.3.5 Overview of empirical approaches

Results part 1 (chapter 5): Medical effort and quality of care

As shown in Table 4.1, in a first results chapter the relationship between the quantity and quality of care is explored. Clinical vignettes are used to compare a doctor's recommended treatment plan for a specific condition with a standard treatment plan that reflects best practice in a low to middle-income setting. This treatment plan is an empirical proxy for medical effort, incorporating cognitive and physical aspects of care. Vignettes are disaggregated, enabling empirical measurement of both insufficient and unnecessary care. Insufficient and unnecessary care are both analysed in terms of their expected cost and health consequences, and their determinants. Finally, patterns of inappropriate care are explored, that is, whether doctors are more likely to provide too little or too much care.

This stage of analysis also provides a quality perspective for subsequent empirical analyses of the impact of incentives on medical effort. Chapter 5 provides a comprehensive description of how these vignettes were used to analyse the relationship between medical effort and quality of care, and corresponding empirical results.

Results part 2 (chapter 6): Incentives and hospital inpatient care

In a second results chapter, analysis focuses on the impact of incentives on the amount of medical effort a hospital inpatient receives. Empirical measures of medical effort are based on both the volume and type of health services a patient receives. These are used as dependent variables in a variety of regression specifications.

Explanatory variables test some of the conceptual framework's key insights, particularly the financial and non-financial incentives a doctor faces to discriminate between patients, and the role of monitoring and information. Regressions also controlled for variation in hospitals' technical capacities and patients' illnesses (both severity and disease type). Chapter 6 provides information on the exact set of dependent and independent variables used. Modelling strategies, and subsequent empirical results, are also described in that chapter.

Results part 3 (chapter 7): Incentives and a doctor's referral behaviour

In the final results chapter, a doctor's referral behaviour is scrutinised, assessing whether doctors unduly influence a patient's use and expenditure in private pharmacies. A first set of regressions analyse whether physicians with direct familial links to a private pharmacy influence patients to use their pharmacy. A subsequent regression set evaluates the determinants of health expenditure, assessing whether patients with prescriptions from pharmacy-owning physicians spend more in pharmacies than patients with prescriptions from other physicians. Finally, observed pharmaceutical expenditures are compared with simulated generic expenditures, to assess whether patients with prescriptions from pharmacy-owning public physicians

would spend less if generic medicines were fully available within public district hospitals. Chapter 7 details the regressions and simulations required for this analysis, along with corresponding empirical results.

Before the results from these three empirical chapters are presented, the next chapter describes the study setting. This provides a context for the empirical research of this thesis.

Chapter 4: Study setting

This chapter provides a general overview of the Philippines. In later chapters, there are additional discussions of specific aspects of the Philippine health system relevant to individual results chapters and associated policy implications.

4.1 Country characteristics

The Philippines is an archipelago of 7107 islands. It is a lower-middle income country located in Southeast Asia, in the western part of the Pacific Ocean. The Philippines has development characteristics that are broadly comparable with other countries at a similar income level, although it has a relatively high level of income inequality (see Balisacan 2003 for an analysis of inequity in the Philippines). Table 4.1 provides some key data on its demography, socioeconomic characteristics and health profile.

Table 4.1 Key data on the Philippines

Demography	
Population [millions, 2007]	88.6m [Census]
Population growth rate [% , 2007]	2% [Census]
Population living in urban areas [% , 2004]	52% [NSO]
Socioeconomic characteristics	
GNP per capita [in USD, 2007]	\$1620 [WB-WDI]
GDP per capita [in USD, 2007]	\$1363 [WB-WDI]
GDP per capita [at purchasing power parity, 2007]	\$3730 [WB-WDI]
Growth rate [of GDP per capita, 2007]	7% [WB-WDI]
Inequity and poverty:	
- GINI coefficient [2006]	0.4580 [FIES]
- Households living below poverty threshold [% , 2006]	26.9% [FPS]
- Households living below food subsistence threshold [% , 2006]	11% [FPS]
Health profile	
Female/Male life expectancy at birth [2005]	73 / 68 [NSO]
Infant Mortality Rate [per 1000 live births, 2006]	24 [FPS]
Under-five Mortality Rate [per 1000 live births, 2006]	32 [FPS]
Maternal Mortality Rate [per 100,000 live births, 2006]	162 [FPS]

Note the website <http://www.nscb.gov.ph/> collates statistical information from various sources for the Philippines. It was the data source for the Census data; FIES (Family Income and Expenditure Survey); FPS (Family Planning Survey); and NSO (National Statistical Office). The other data source used was WB-WDI (an acronym for: World Bank-World Development Indicators).

Figures 4.1a and 4.1b compare selected health indicators of the Philippines with other countries. They show that the Philippines has a health profile that is broadly in line with other countries which are at similar levels of economic development.

Figure 4.1a Plot of Under-five mortality rate – GDP per capita (131 low and lower-middle income countries)

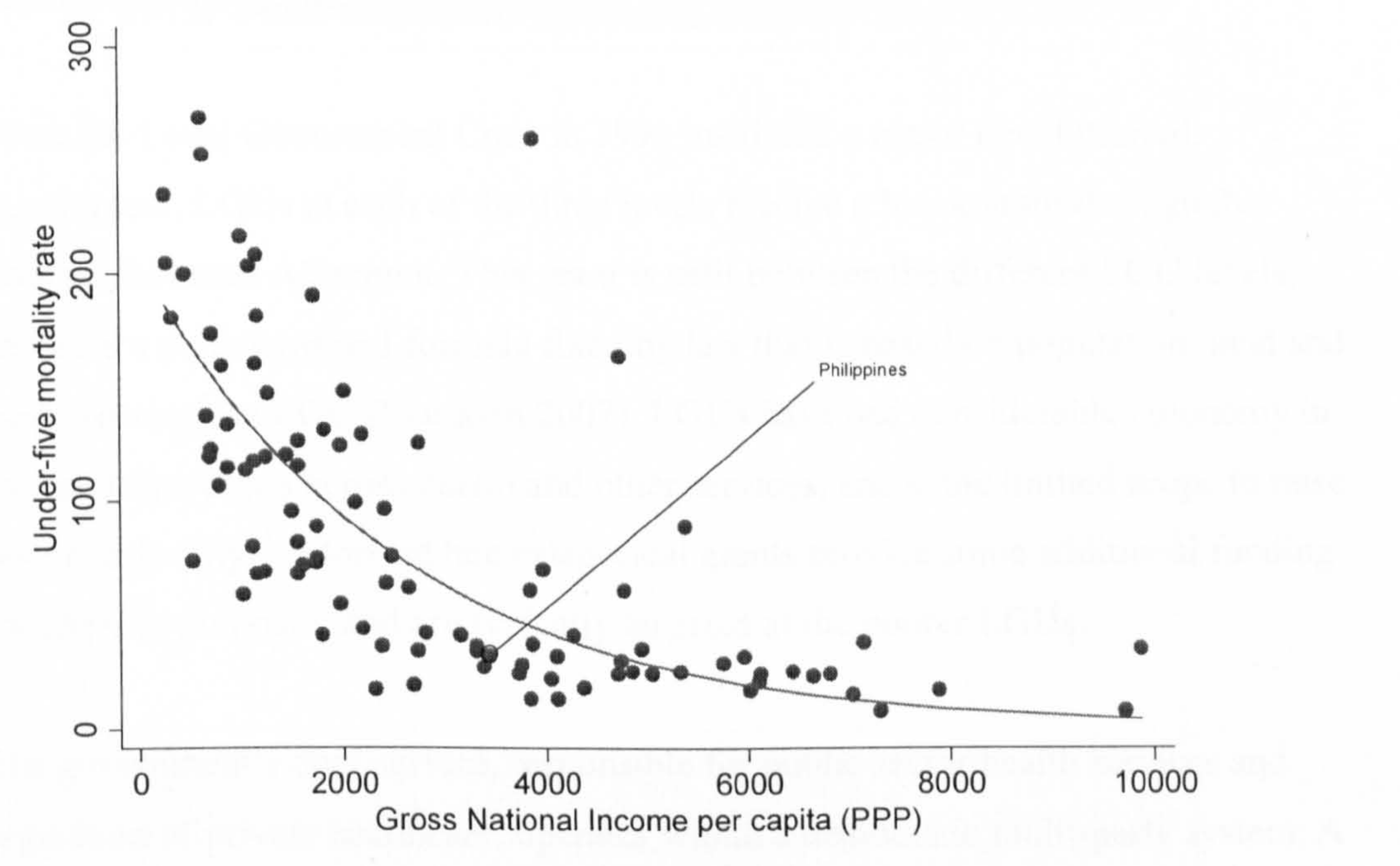
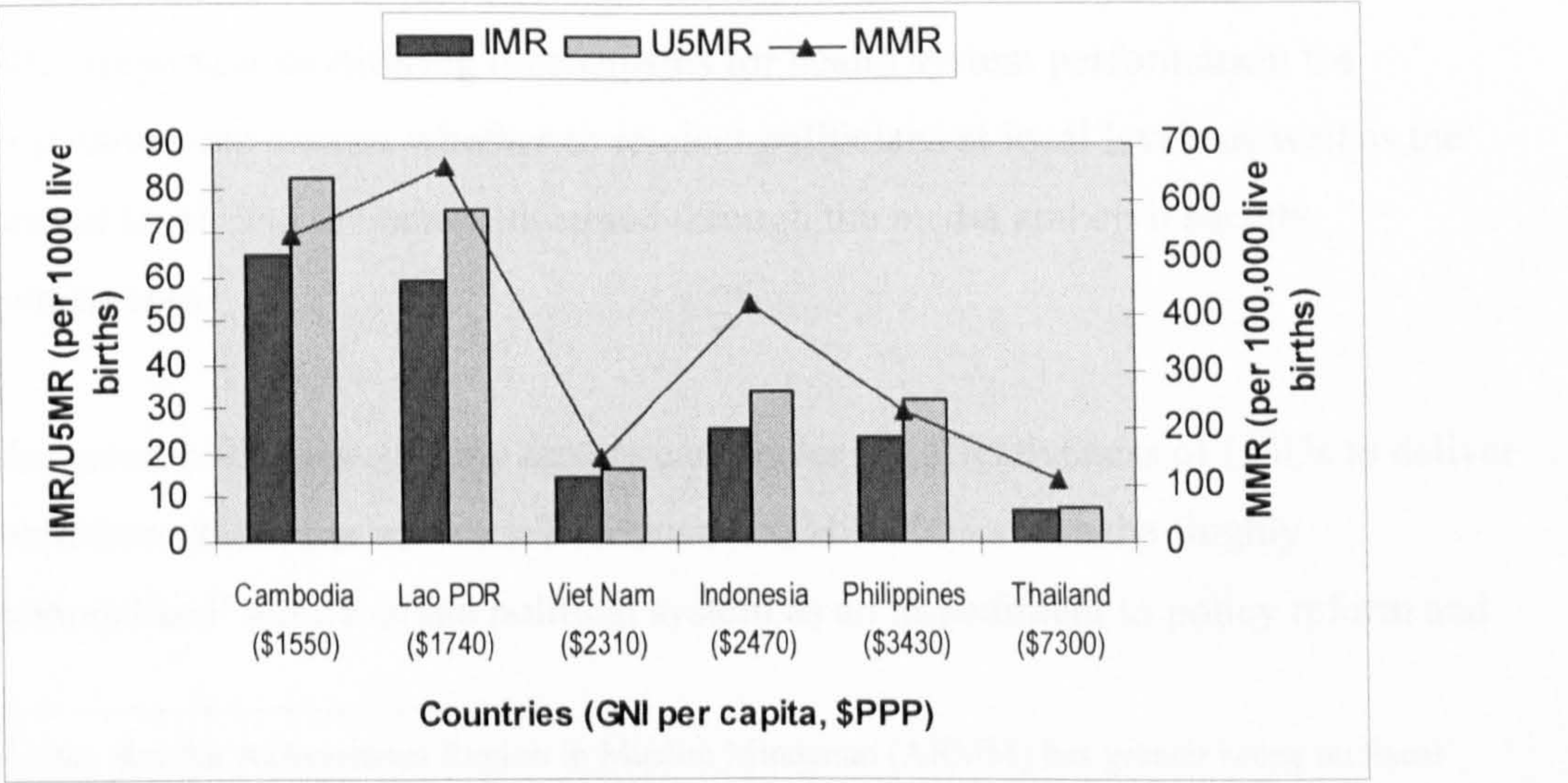


Figure 4.1b Health profile, compared with selected neighbouring countries



4.2 Government administration and political economy

In the Philippines, government is divided into the central level and three local government unit (LGU) levels – 81 provinces, 1631 municipalities/cities, and 41995 barangays (villages) as of December 2008 – with elections occurring at each of these levels <http://www.nscb.gov.ph/activestats/psgc/>. These LGUs are grouped into 17 administrative regions.

Since the Local Government Code in 1991 instituted a major devolution of government, LGUs at each of the three levels receive a block grant through the Internal Revenue Allotment. This grant is split between the different LGU levels, and uses a predetermined formula fixed by law that is based on population, land and equal sharing per LGU (Manasan 2007). LGUs have had considerable autonomy in the use of revenues across health and other services, and some limited scope to raise revenues locally¹¹. More ad hoc categorical grants provide some additional funding for specific purposes, and are typically targeted at the poorer LGUs.

The government's civil service, responsible for public sector health services and regulation of private healthcare, operates within a democratic multi-party system. A free media and active civil society provide in principle checks and balances on the executive power of the president (de Dios and Hutchcroft 2003). Together, these offer important monitoring mechanisms for health system performance: the population can choose whether to re-elect politicians at local levels as well as the central level, and are better informed through the media and civil society movements.

However, political economy factors can hinder the effectiveness of LGUs to deliver healthcare and other services. Balisacan and Hill 2003 stress the 'highly personalised' nature of the political system as an impediment to policy reform and

¹¹ Note that the Autonomous Region in Muslim Mindanao (ARMM) has greater scope on fiscal policy than elsewhere in the country, and also receives additional financial support from the central government.

implementation. Similarly, de Dios 2007 highlights the conflicts between ‘elite factions’ as an adverse affect on economic development. Such political economy concerns are relevant because after each regime change (nationally or locally) there are concurrent personnel changes within the civil service. This can affect the relative priority afforded to the health sector and, more generally, policy consistency, over time.

4.3 The financing and provision of healthcare

Facts and figures in this section, unless otherwise stated, come from the Philippine National Objectives for Health (NOH) 2005-2010 (Department of Health 2005).

4.3.1 Healthcare financing

According to the latest National Health Accounts (NHA) figures, total health expenditure was 181 billion Philippine Pesos (PHP) in 2005 (<http://www.nscb.gov.ph/stats/pnha/2005/default.asp>). This amounted to 3.3% of GDP and was equivalent to 2120 PHP per capita (\$38.5 USD). For the period 1991-2005, per capita health expenditures have, in real terms, been growing at an average annual rate of 3.6%.

Healthcare is financed through a variety of sources (chapter 6 explores how this mix of sources can affect the quality of hospital care). Government contributes to the operating expenses of public health facilities, as well as a variety of public health programmes (section 4.3.2 describes the government's role in the provision of health services). This funding is paid to providers through budgets for health facilities and fixed salaries for public health workers.

The Philippine Health Insurance Corporation (PHIC) reimburses members for the inpatient services they receive in accredited public and private hospitals. Reimbursement to members is on a first peso basis, with budget ceilings for different health service categories (Obermann *et al.* 2006). The hospitals providing these services are reimbursed by PHIC through a fee-for-service system, with the hospital manager distributing these to hospital staff (the attending physician, though, always receives some payment for treating a PHIC member). In 2006, PHIC had reached nearly 70 million beneficiaries, covering approximately 79% of the population (Shimkhada *et al.* 2008). Following the National Health Insurance Law of 1995, PHIC aims to move towards universal population coverage, expand insurance benefits and ensure high quality care (both the technical and interpersonal aspects of

healthcare quality). Private insurance provides supplementary insurance, particularly in the National Capital Region.

Despite these different prepayment sources, insured as well as uninsured households continue to spend significant amounts in the form of out-of-pocket (OOP) expenditures. These expenditures are made within public and private hospitals (including consultations, room and board charges, and, when available, medicines and diagnostic services), as well as in private pharmacies and other ancillary health facilities. Further, the amount charged to patients can vary within and as well as across hospitals (Capuno 2006).

NHA figures illustrate that OOP health expenditures by households were the principal source of funds in 2005, amounting to 88 billion PHP, and equivalent to 1032 PHP (\$18.7 USD) per capita. Table 4.2 shows how this compares with the other main sources of funds for health in the Philippines.

Table 4.2 Sources of funds, 2005 (NHA figures)

	Billion PHP	As % of Total health expenditure
Total health expenditure	181	(100%)
Government	52	29%
...central government	...29	...16%
...local government	...23	...13%
PHIC	20	11%
Out-of-pocket	88	49%
Other ^a	21	12%

^a Includes private insurance, private schools, international aid.

The shares of health expenditure from government and PHIC sources remain below national targets of 40% and 30% respectively (Department of Health 2005). These targets reflect the risk that OOP expenditures can result in households facing catastrophic expenditures or being impoverished. Indeed, cross-country analysis has shown a strong positive association between the share of OOP in total health expenditure and the proportion of households facing catastrophic expenditures, and consequently the need to move towards financing systems based on prepayment (Carrin *et al.* 2008; Xu *et al.* 2003).

4.3.2 Healthcare provision

The organisation of the public aspects of the health system broadly mirrors that of the government administration as a whole, with devolved LGUs responsible for the provision of most personal health services. Provincial LGUs manage secondary level healthcare (provincial and district hospitals); primary care services (rural health units and barangay health stations) are under the jurisdiction of municipal LGUs. These LGUs have considerable discretion from the central level in how much of local government budgets are allocated to healthcare as compared with other, competing departments (Bossert and Beauvais 2002). At the same time, concerns have been raised that devolution has actually led to health facilities having less managerial autonomy and budgetary support than previously (Department of Health 2005; Grundy *et al.* 2003).

Nevertheless, within this devolved system of health provision, the Department of Health (DOH) at the central level continues to finance and manage tertiary hospitals, and certain other speciality health facilities, throughout the country. The DOH is also closely linked to LGUs through its mandate to formulate and maintain national policies, plans, standards and guidelines, and through its contribution to communicable disease control.

The private sector also plays a significant role in the delivery of personal health services. For example, private hospitals provided 47% of the nation's hospital beds in 2002. These private hospitals are made up of both for-profit and not-for-profit facilities.

A number of actors in the health system help monitor the quality of healthcare provided in health facilities (chapter 5 analyses the quality of care in relation to the quantity of care provided). As mentioned above, the DOH is responsible for formulating standards and guidelines. Further, the DOH, in partnership with LGUs, set up 'Inter-Local Health Zones' in 1999 (with 73 of these zones established by

2005). These are designed to improve coordination between facilities, and across the central and local levels (Department of Health 2005). The DOH also instituted the ‘Sentrong Sigla’ movement, whereby accreditation signals to patients that the health facility has met certain structural quality standards (Catacutan 2006). In addition, the PHIC plays a role in quality assurance by monitoring hospitals (public and private) through its accreditation process and claims review (Quimbo *et al.* 2008).

In terms of the use of public and private facilities, data in table 4.3 below suggests that private hospitals cater mostly for wealthier members of the population. In contrast, in the public sector there is a more equal distribution of utilisation across income groups. For instance, over a six month period 22% of the richest income quintile utilised a private hospital, as compared with 2% of the lowest income quintile. In contrast, the equivalent figures for public district hospital utilisation were 2.6% and 3.7% for the richest and poorest income quintiles respectively.

Table 4.3 Percentage of households that utilized public and private health facilities in the 6 months preceding the survey, by wealth index quintile (2003)

Income quintile	Primary health facilities		Hospitals			
	Public Rural Health Unit	Private Clinic	Public district hospital	Public provincial hospital	Public tertiary hospital	Private hospital
1 (low)	16.4	5.4	3.7	4.0	1.9	2.1
2	19.4	8.9	3.9	6.2	3.4	4.1
3	18.1	12.4	3.7	4.9	3.6	7.6
4	17.1	19.1	3.1	5.3	3.5	11.7
5 (high)	9.9	25.2	2.6	4.1	3.9	22.4

Source: National Demographic and Health Survey (NDHS), 2003

The health workers responsible for staffing public health facilities receive salaries that, although noticeably higher than the country’s GDP per capita, are much lower than what they could earn in alternative employment. For instance, the average reported annual salary of physicians working in public secondary level hospitals was just under 200,000 Philippine Pesos in 2002 (less than \$4000) in the Visayas island group (source: QIDS dataset). This is considerably less than the mean annual salary of approximately 526,000 (\$13,500) for self-employed physicians in 2002 (Refre *et*

al. 2004) and, more strikingly, the \$36,000-48,000 that they could earn, after retraining, as a nurse in the US (Choo 2003). Indeed, the Philippines is believed to be the leading exporter of nurses (Aiken *et al.* 2004), and the second major exporter of physicians (Bach 2003).

Ancillary health facilities (such as dental practices, diagnostic clinics, employer-based outpatient facilities, indigenous healers, maternity centres and pharmacies) supplement the provision of health services in hospitals and primary health facilities. These are most often privately owned and run on a for-profit basis. For example, in relation to the pharmaceutical retail market, commercial private pharmacies account for 85% of drugs sold in the Philippines. Public doctors are widely believed to own pharmacies and other ancillary health facilities as a way of boosting their low public sector salaries (chapter 7 explores this phenomenon).

This chapter has described the Philippine study context. The following three chapters present the empirical results of the thesis.

Chapter 5: Do doctors provide too little or too much care? Which matters more?

5.1 Introduction

For healthcare provision to be effective in improving a patient's health, health workers require not only adequate medical inputs, but also need to use these resources correctly. Consequently the technical quality of healthcare has been evaluated in a wide variety of ways¹². This chapter investigates the relationship between the technical quality of care provided and the amount of medical effort a doctor exerts on a patient, corresponding to the first objective of the thesis. The premise is that doctors can provide too little or too much care, both of which can negatively impact upon healthcare quality.

The focus of the present chapter is on the doctor-patient interaction, commonly referred to as the process attribute of quality (Donabedian 1980). Furthermore, it analyses only the clinical skill of the doctor: how skilfully a doctor diagnoses and treats a patient, commonly referred to as *technical quality*. Data are not available on more interpersonal aspects of care, such as showing respect and kindness to the patient.

The general empirical approach is to compare a doctor's suggested treatment plan with a predefined essential treatment plan that equates to best practice for a specific medical condition. Data comes from clinical vignettes, administered to public and private physicians in the Philippines. These vignettes simulate specific clinical encounters, and include precise definitions of best practice (see section 5.2.1 for further details).

¹² Chapter 2 discusses the different dimensions of quality, and how technical quality has been measured and evaluated.

Using these vignettes, inappropriate care can be separated into care that is insufficient and care that is unnecessary. Thus medical effort is empirically evaluated in terms of the quantity of healthcare given to patients. In a first stage, the extent of *insufficient care* is measured in terms of which aspects of the essential treatment plan were not given. Next, *unnecessary care* is measured by a doctor's treatment suggestions that are not part of the essential treatment plan. Both insufficient and unnecessary care are then analysed in terms of their expected cost and health consequences, and their determinants. Finally, the relationship between insufficient and unnecessary care is explored. This illustrates *patterns of inappropriate care* – that is, whether doctors are more likely to provide too little or too much care.

Research elsewhere has already highlighted that some doctors in the Philippines, in common with other LIC and LMIC, provide a poor technical quality of healthcare (see, for example, Peabody and Liu 2007). Exploration of this quality-quantity relationship adds to these findings by evaluating whether under- or over-provision is likely to be of greater concern to policymakers. By distinguishing when more health care is desirable (in terms of being part of essential care) as compared with being unnecessary, it also contributes to the efficiency literature. This is relevant because studies that explicitly evaluate a health provider's efficiency have been criticised as not adequately accounting for quality of care (Hussey *et al.* 2009). Finally, this chapter frames analysis in the following chapter on the effect of incentives on public hospital care. This subsequent chapter analyses how incentives influence the quantity of care a doctor provides to a patient. More normative inferences about quality of care are then made from findings in this chapter, based on when more (less) care is likely to equate to better or worse quality.

5.2 Methods

5.2.1 Clinical vignettes and the quality-quantity relationship

As part of the QIDS study, clinical vignettes were administered to both public and private physicians (see chapter 3 for full details on the dataset used). Physicians were asked how they would care for a range of paediatric cases, which are then compared with a predefined essential treatment plan. These predefined treatment plans were based on international evidence-based standards that were then reviewed by national (Philippine) experts. By assessing how close doctors are to providing a set of actions needed to improve the sick child's health, these vignettes provide a quantitative measure of a physician's technical quality of care.

The QIDS study defined fifteen vignettes, five related to each of pneumonia, diarrhoea and dermatological infections. During the study period, physicians answered one or more vignette of each disease type. Within each disease type, the vignette/s a physician was assigned to answer was randomly chosen.

Vignettes are made up of five sequential domains of care, evaluating a doctor's ability in terms of:

- asking questions about the patient's symptoms and medical history
- performing physical examinations
- ordering laboratory tests
- arriving at a diagnosis for the patient
- compiling a recommended treatment plan for the patient

After each of these stages, the doctor is given the details of the patient's condition for that domain. For instance, after describing the questions she would ask about the patient's symptoms and medical history, the doctor would then be told the child's actual complete medical history and symptoms. This means that at the end of the vignette, when the doctor is asked what her treatment plan would be, she would be fully informed about the child's medical condition.

In this chapter, the interest is in disaggregating these vignettes, so that deviations from best practice can be separated into insufficient and unnecessary care. As noted earlier, doing so contributes to a better understanding of the relationship between quantity and quality of care. This chapter focuses on one of the five dimensions of care that vignettes measure, namely a doctor's recommended treatment plan for the patient. This is because the expected health and cost consequences of over-treatment are more likely to be substantial than over-provision in other dimensions of care. For example, unnecessarily giving a child certain medications can be expensive and harmful. In contrast, asking too many questions about a patient's symptoms and medical history, or performing too many physical examinations is only marginally more expensive (by increasing consultation time), and rarely harmful. Further, whilst ordering too many laboratory tests can be as expensive as over-treatment, it is rarely harmful to a patient.

Four of the fifteen vignettes included in the QIDS study are used in the present analysis. These were vignettes where over-treatment as well as under-treatment is particularly likely to occur (for instance, giving antibiotics or other medicines unnecessarily). Further, pneumonia and diarrhoea vignettes were chosen (two of each), for better linkages with the analysis in chapter 6 on hospital care given to pneumonia and diarrhoea inpatients. Box 5.1 describes each of the four vignettes used in this chapter.

Box 5.1a: Description of Diarrhoea Vignette #1**Description of case**

- A mother comes to the clinic with her daughter, an 8-month old baby. She states that her daughter has had diarrhoea and is vomiting.
- *Symptoms/medical history:* The diarrhoea started 2 days ago at the same time as the vomiting. The baby has had very loose, watery stools, without blood or mucus, in her diaper about 6 -7 times throughout the day and night. She has had a low-grade fever and has not eaten very much. She vomited 3 or 4 times yesterday but only twice today. The child has been almost weaned from breast milk, breastfeeding twice a day for the past month. Yesterday, she drank a little water from a cup but would not breast-feed. Today she has breast-fed once and has been drinking some diluted mango juice. She has urinated once today, about 6 hours ago. The little girl's older sister, aged 2, had a similar problem about 1 week ago but the symptoms lasted only a day. She has no prior history of similar episodes, any known drug allergies or other medical problems. Her mother reports that the delivery was normal.
- *Physical examinations:* The child is alert and interactive, but tearful and irritable. The pulse is strong at 170 beats per minute. Temperature is 39 C. Eyes are sunken. Mucus membranes are somewhat dry. The skin pinch goes back in 1 second. The fontanelle is not depressed. The head is normal without nuchal rigidity, the abdomen is mildly tender but there is no guarding, rigidity or rebound. Bowel sounds are normal. Her capillary refill time is approximately 3 seconds. Faeces in the diaper are negative for blood. Weight is 7.5 kg, the length is 68cm.
- *Laboratory tests:* All laboratory tests are normal.

Essential treatment plan

Essential treatment plan is made up of 9 different components, with 4 related to advice on homecare and supplements, 3 to medication and 2 to monitoring of the child's condition.

Box 5.1b: Description of Diarrhoea Vignette #2**Description of case**

- A 3 year old boy is brought to the clinic by his mother. She states that her son has diarrhoea and vomiting.
- *Symptoms/medical history:* The diarrhoea started 2 days ago at the same time as the vomiting. The stool was described as loose and watery without blood or mucus. The diarrhoea episodes occur 7-8 times throughout the day and night. He vomited 3-4x yesterday and today; there is no blood in the vomit. He had a low-grade fever and has not eaten well. His mother offered some water but he refuses and drinks only a small sip. He has not been given any medication nor has he ingested any new foods or foods that might be contaminated. His mother does not know when he last urinated. No one else has been ill in the (his) family. He has no previous history of similar symptoms, any known drug allergies or other medical problems. His mother reports the delivery was normal.
- *Physical examinations:* The boy appears calm and he is lethargic. He weighs 10 kilograms and his height is 96cm. He is afebrile, the pulse rate is 150 beats/minute, his blood pressure is 70/35 and his respiration 55. The mucus membranes are dry and the eyes are sunken. The skin pinch returns to normal in 3 seconds. The chest exam is normal. The abdomen is soft with no guarding, rigidity or rebound and the bowel sounds appear increased by otherwise normal. Stool/rectal exam is negative for blood.
- *Laboratory tests:* The only laboratory results that are available are a CBC which shows a haemoglobin of 12.5 and a WBC of 6. Fecalysis reveals no RBCs or excessive WBC in the stool. All other laboratory tests are pending.

Essential treatment plan

Essential treatment plan is made up of 9 different components, with 2 related to advice on homecare and supplements, 4 to medication, 2 to monitoring of the child's condition and 1 requiring hospitalisation.

Box 5.1c: Description of Pneumonia vignette #1**Description of case**

- A mother brings her 6-month old baby to the clinic. She states that her daughter has had cough and fever.
- *Symptoms/medical history:* The baby's condition started 1 week ago with cough and colds with whitish nasal discharge. She later developed moderate- to high-grade fever temporarily relieved by Paracetamol. She is active, cries easily but is consolable but irritable and the mother reports that she continues to feed. The mother does not report any difficulty breathing or any episodes of cyanosis, convulsion, or any rashes. The baby was breastfed for the first 2 months and formula fed thereafter. No solid food has been introduced yet. The baby has received the following immunization through the local health center: BCG, DPT (3 doses), OPV (3 doses). The mother denies any history of asthma in the family or the patient having been with a respiratory disease in the past.
- *Physical examinations:* The baby weighs 8 kilograms and is 68 cm long. She is awake but crying. She is febrile with temperature of 38.5 oC. Her heart rate is 140 beats/minute; respiratory rate is increased at 42/minute but she has no circumoral cyanosis. There is no tonsillopharyngeal congestion. No stridor is noted. There is supraclavicular and intercostals retractions but there does not appear to be any lower chest indrawing. There are crepitant rales on all lung fields, bilateral. There is no wheezing and there are no cardiac thrills or murmurs. The nailbeds are pinkish. There is no evidence of dehydration.
- *Laboratory tests:* The CBC showed an elevated white blood count of 14,000 with predominance of polymorphonuclear leukocytes. No chest x-ray is available.

Essential treatment plan

Essential treatment plan is made up of 5 different components, with 1 related to advice on homecare and supplements, 2 to medication and 2 to monitoring of the child's condition.

Box 5.1d: Description of Pneumonia vignette #2**Description of case**

- A mother brings her 3-year-old boy to the clinic. She states that her son has fever and cough.
- *Symptoms/medical history:* The mother states that her son was previously well until 1 week ago when he started to have fever and cough. The fever is low to moderate grade and occurs intermittently. She also reports that he had some sneezing and a runny nose. It is temporarily relieved by Paracetamol. The cough is noted to be getting somewhat worse since its onset and it is productive of moderate amounts of clear-white phlegm. He did not have any episode of cyanosis or difficulty breathing however. His appetite is fine and the child is not extremely thirsty. His immunizations are updated. His 8-month-old sister also had similar symptoms and has just been discharged from the hospital 1 week ago. He has no other medical problems, and has not been sick like this in the past. The child has no known allergies and is on no other medications.
- *Physical examinations:* The boy weighs 13.5 kilograms and is 90 cm tall. He is awake and active. He is febrile with temperature of 38.7C. The cardiac rate is 120 beats/minute, respiratory rate is 33/minute. There is no circumoral cyanosis, the nailbeds are pink, and no tonsillopharyngeal congestion. There is no intercostal retraction or lower chest wall indrawing. There are no rales or wheezes but there is occasional ronchi. There are no thrills or murmurs.
- *Laboratory tests:* The CBC showed white blood cell count of 11,000. The haemoglobin is 13.2 grams %. The mother refused to have the chest X-ray done.

Essential treatment plan

Essential treatment plan is made up of 4 different components, with 1 related to advice on homecare and supplements, 1 to medication and 2 to monitoring of the child's condition.

5.2.2 Measuring the extent of inappropriate care

Insufficient versus unnecessary care

For these four vignettes, a doctor's response to how they would treat the sick child is disaggregated into:

- How much of the essential treatment plan was completed, measuring the extent of insufficient care. For each vignette, a number of essential actions are defined (9 actions for each diarrhoea vignettes; 4 and 5 actions for the pneumonia vignettes), and the doctor is evaluated in terms of what percentage of this essential treatment plan is completed.
- The number of additional non-essential treatments that were given, measuring the extent of unnecessary care. These are treatments a doctor recommended that are not on the essential treatment plan.

Both insufficient care and unnecessary care are then evaluated in terms of their expected health and cost consequences (see section 5.2.3).

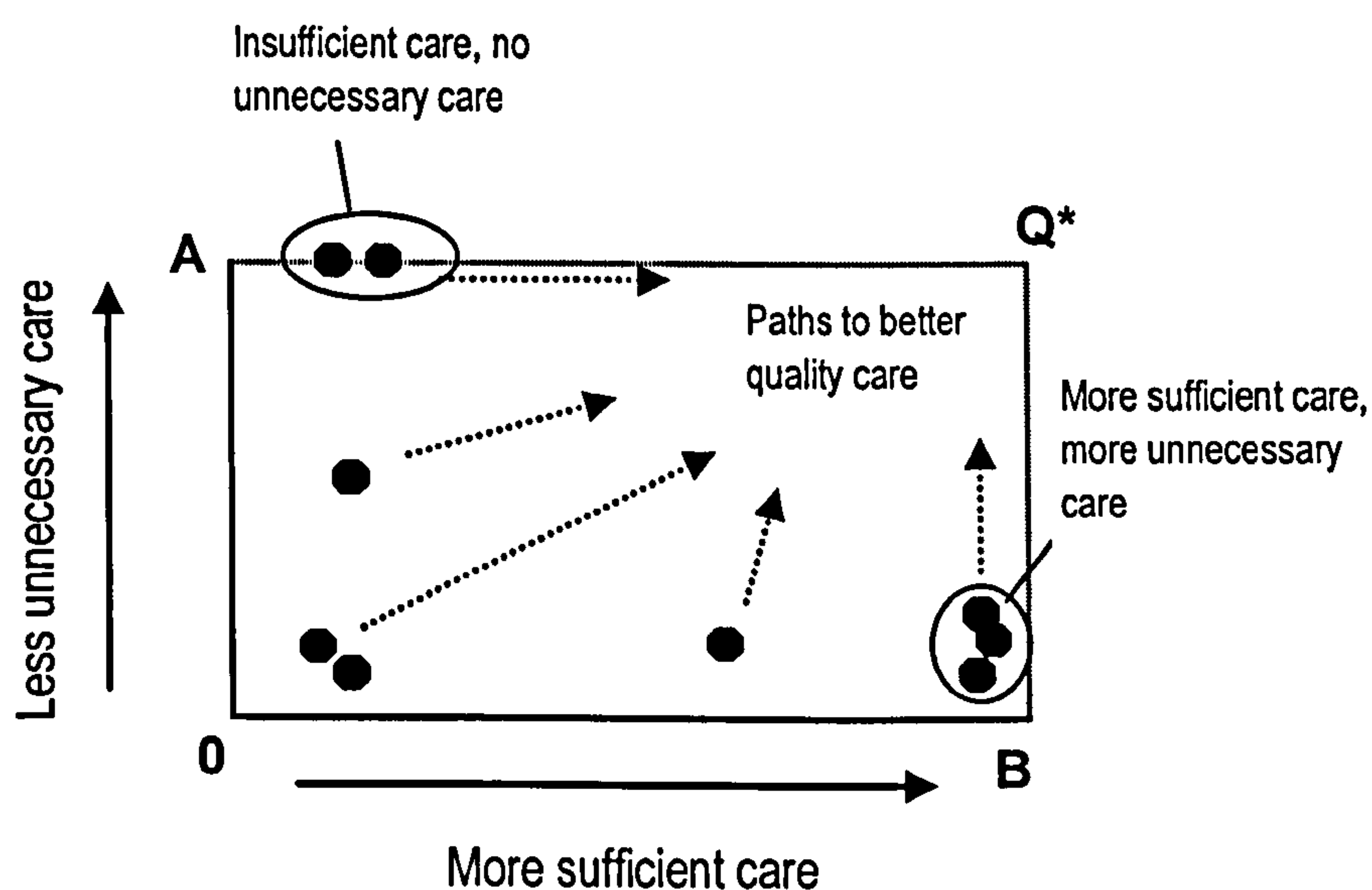
Patterns of inappropriate care

Having evaluated the extent and consequences of insufficient and unnecessary care, the relationship between the two is explored. This provides added insight into the relationship between quantity and quality of care by illustrating different patterns of inappropriate care. That is, whilst it is evident that reducing the extent of insufficient care and unnecessary care both improve quality of care – in terms of moving a doctor's healthcare provision closer to best practice – analysing patterns of inappropriate care determines whether doctors more often provide insufficient care, unnecessary care or indeed both simultaneously.

Figure 5.1 helps illustrate this. Q* refers to optimal quality of care (best practice), whereby doctors provide both fully sufficient care and do not provide any unnecessary treatments. Doctors whose treatment plan is positioned along the line AQ* do not give any unnecessary treatments, but fail to provide fully sufficient care. Doctors along the line BQ* provide fully sufficient care, but also give unnecessary treatments. If doctors are grouped near the point OA, then insufficient care is more of

a concern for policymakers than unnecessary care. Conversely, if doctors are grouped nearer point 0B, then unnecessary care is more common than insufficient care. Moreover, if doctors are grouped along either or both of lines AQ* and BQ*, then the relationship between quantity and quality of care can be summarised in one dimension: doctors give either too much or too little care. However, if doctors are instead typically inside the 0AQ*B box, then doctors provide insufficient and unnecessary care simultaneously.

Figure 5.1 Different patterns of inappropriate care



5.2.3 Evaluating the consequences of inappropriate care

Evaluating the consequences of inappropriate care is important in assessing whether insufficient or unnecessary care is more of a concern to policymakers, and the consequences of observed patterns of care. Both the cost and health consequences of inappropriate care are analysed.

Expected cost consequences

Non-essential treatments and each aspect of the essential treatment plan are classified according to their likely (societal) cost implications. Classifying treatments in terms of their expected cost enables evaluation of the costs incurred

from giving non-essential care, as compared with the inputs required to switch from providing insufficient to sufficient care.

Four broad treatment categories are distinguished:

- Hospitalisation
- Medications (drugs and therapies)
- Monitoring of condition by doctor
- Advice on homecare / Supplements

Given data limitations, only approximate cost estimates are possible. Treatment categories' expected costs are defined in terms of being low, medium or high. Estimations are based on extrapolations from pharmacy exit, facility and physician surveys used for other empirical chapters in the thesis (see chapter 4 for details on these surveys).

Hospitalisation of a patient is expected to be relatively costly compared with the other treatment aspects specified. It is classified as medium to high cost. For example, facility survey data from 30 hospitals indicate that the total healthcare charges inside a public district hospital was just under 1700 PHP (\$32 USD) for pneumonia patients, and 1200 PHP (\$23 USD) for diarrhoea patients, during the time period 2003-2007. These are lower-end estimates, as they exclude associated indirect costs such as travel and food costs.

Medications are classified as low to medium cost. Pharmacy exit data from 29 private pharmacies in the Philippines estimate an average pharmaceutical expenditure of 260 PHP (\$6 USD) in 2007 for customers with a prescription. Private pharmacy data was preferred to data on drug expenditure within Philippine public hospitals, since these hospitals typically have incomplete stock, and thus patients have to purchase some or all of their prescribed medicines outside of the hospital (see chapter 7 for further details).

Monitoring of a patient’s condition by the doctor is also classified as low to medium cost. In these vignettes, monitoring includes checking for, and reassessing, vomiting, urination and normalisation of heart rate. The main cost is that associated with a doctor’s time, but also includes other health facility costs. Physician survey data indicate an average reported public physician salary (all sources) to be just under 25,000 PHP (\$470) per month. Assuming a doctor works 160 hours per month, and that monitoring of a patient’s condition takes one hour, the time cost is approximately 150 PHP (\$3 USD). Other health facility costs include the use of medical instruments and time costs of nurse and other support staff, but there are no data available on these costs.

The treatment category advice on homecare / supplements is classified as low cost. Advice on homecare only adds a few minutes to consultation time, and supplements can be purchased cheaply from pharmacies (and sometimes freely from primary health centres). Thus the cost for this category is expected to be less than the cost of monitoring and of prescribed medications.

Table 5.1 Treatment categories and expected costs

Treatment category	Expected cost	
Hospitalisation of patient	Medium-High	> \$20
Medication (drugs, therapies, ORS)	Low-Medium	~ \$5
Monitoring of condition by doctor	Low-Medium	~ \$5
Advice on homecare / Supplements	Low	< \$5

Expected health consequences

To examine the health consequences of a doctor’s recommended treatment plan, three physicians were asked to evaluate independently the health consequences of: (a) not undertaking different aspects of essential treatment plans, and (b) each non-essential treatment given. These were evaluated in terms of the probability that they would be harmful, health neutral or beneficial to the patient, and, if harmful, their likely severity. Evidently, insufficient care cannot be beneficial or health neutral to a patient.

The treatments were classified as:

- Definitely harmful
- Probably harmful
- Possibly harmful
- Health neutral
- Possibly beneficial
- Probably beneficial
- Definitely beneficial

and if harmful, whether they were expected to cause a:

- Severe adverse event (involves hospitalisation or being life threatening)
- Moderate adverse event (neither lasting nor severe)
- Mild adverse event (minor)

The physicians chosen to evaluate expected health consequences were all paediatricians and markers for the clinical vignettes. After their independent evaluations of the expected health consequences of insufficiency and unnecessary care, results were returned to the physicians with disparities in their answers highlighted. The three physicians then met to discuss these disparities until consensus was reached.

5.2.4 Determinants of inappropriate care and pooling validity issues

Determinants of inappropriate care

Whilst the focus of this chapter is on analysing the relationship between quantity and quality of care given (and consequently the implications of inappropriate care), the determinants of inappropriate care are also briefly explored.

Public and private doctors were compared in terms of:

- The extent of insufficient care
- The probability of providing unnecessary care with harmful health effects

This was done across each of the four vignettes used in this chapter.

Multinomial regressions were also run to analyse the determinants of different patterns of inappropriate care. However, this approach was limited by the properties of the sample, particularly small cell sizes for certain types of insufficient and unnecessary care. Consequently, results from these regressions did not provide any additional information to the bivariate comparisons of public and private doctors across vignettes (even when including additional explanatory variables), and are therefore not presented in this chapter.

Pooling validity issues

The analysis uses data from two time periods. However, two policy interventions (expanded insurance coverage and higher reimbursement ceilings for children in ‘access’ public hospitals, and bonus payments for meeting quality standards in ‘bonus’ public hospitals: see chapter 3 for details) were introduced after the baseline that were expected to positively impact upon the quality of care provided. Whilst this chapter is not an analysis of these interventions’ impacts on quality of care, it is nevertheless important to ascertain whether it is valid to pool data across the two time periods in the context of the analysis in this chapter.

Assessing the validity of pooling over time is based on two criteria:

- Whether there is a statistically significant difference in the extent of inappropriate care between the two time periods. If there are no differences, then pooling is deemed valid. This is evaluated for the full sample and for sub-samples reflecting the two policy interventions.
- If inappropriate care is statistically less significant in the second (first) time period, whether it is still of policy significance in the second (first) period. If inappropriate care remains a concern in both time periods, then pooling is deemed valid. For insufficient care, policy significance is taken to be if the average percentage of the essential treatment plan completed remains statistically less than 75%. For unnecessary care, policy significance is assumed to be if the average

number of non-essential treatments given remains statistically greater than zero. If so, then pooling is deemed valid.

Another potential pooling validity issue relates to how many of the 4 vignettes used in this chapter a doctor answered. If doctors learn over time how to answer vignettes better, then doctors answering multiple vignettes can be expected to score systematically higher than doctors answering only one of the vignettes. However, this potential bias is reduced by the fact that no doctor answered the same vignette twice. Further, 15 vignettes were used in the QIDS study, with most doctors answering multiple vignettes even if they only answered one of the four vignettes used in the chapter. Thus systematic bias seems unlikely. Nevertheless, to ensure that pooling data on doctors answering one or multiple vignettes is valid, the two criteria used to assess the validity of pooling over time are used here.

5.3 Results

5.3.1 Descriptive statistics

Validity of pooling

The sample was composed of 160 vignettes, with the number of different doctors answering these vignettes equal to 143. Of these, 128 doctors completed one of the four vignettes used in this chapter, 13 doctors undertook two of four vignettes, and 2 doctors completed three of four vignettes.

Table 5.2 Number of doctors and vignettes

	Number of doctors	Number of vignettes	
Doctor completed 1 of 4 vignettes	128	128	(128*1)
Doctor completed 2 of 4 vignettes	13	26	(13*2)
Doctor completed 3 of 4 vignettes	2	6	(2*3)
Total	143	160	

There were no significant differences in the extent of insufficient or unnecessary care between doctors who answered one vignette and doctors who answered more than one of the four vignettes used (see table 5.3). Thus pooling across these two sub-groups was deemed valid.

Table 5.3 Validity of pooling doctors answering 1 vignette with doctors answering more than 1 vignette

	1 vignette per doctor	>1 vignette per doctor	Difference: p-value
Insufficient care: average % of essential treatment plan given	50%	49%	0.4313
Unnecessary care: ave. # of non-essential treatments given	1.37	1.5	0.2946
Number of doctor-patient interactions (n)	128	32	
Number of doctors	128	15	

There were also no significant differences in the extent of insufficient care between the two time periods, either for the full sample or for the sub-samples (see table 5.4a). Further, the percentage of the essential treatment plan completed was significantly less than 75% in all sub-samples. Unnecessary care, though, actually increased in the second round (see table 5.4b). However, unnecessary care was still a

concern in the baseline, where the average number of non-essential treatments given was significantly greater than zero in all sub-samples. Thus for the remainder of this chapter, analysis was based on data pooled across the two time periods.

Table 5.4a Validity of pooling over time: insufficient care

<i>Average percentage of essential treatment plan given</i>	Baseline %	n	Round 2 %	n	Difference: <i>p</i> -value
Full sample	50%	112	48%	48	0.3351
Access intervention sub-sample	45%	17	49%	16	0.3238
Bonus intervention sub-sample	48%	22	54%	17	0.2240
Control group sub-sample	42%	19	30%	5	0.1642
Private doctors sub-sample	56%	54	48%	10	0.1865
<i>Percentage of essential treatment plan significantly < 75% in all sub-samples (p-value <0.01)</i>					

Table 5.4b Validity of pooling over time: unnecessary care

<i>Average number of additional non-essential treatments given</i>	Baseline # Treatments	N	Round 2 # Treatments	n	Difference: <i>p</i> -value
Full sample	1.15	112	1.96	48	0.0001
Access intervention sub-sample	1.53	17	1.63	16	0.4249
Bonus intervention sub-sample	0.82	22	2.24	17	0.0002
Control group sub-sample	1.37	19	2.4	5	0.0352
Private doctors sub-sample	1.09	54	1.8	10	0.0342
<i>Number of non-essential treatments given significantly > zero in all sub-samples (p-value<0.01)</i>					

Sample characteristics

Public doctors answered 96 of the vignettes, private doctors answered 64 vignettes. More private doctors answered the two pneumonia vignettes used in this chapter (49/64) than public doctors (29/96), with the converse true for diarrhoea vignettes. Female physicians made up 64% of the sample (103/160). The average physician age was 42. Table 5.5 provides further details, disaggregated by vignette.

Table 5.5 Sample characteristics, full sample and by vignette

	Full Sample	Diarrhoea #1	Diarrhoea #2	Pneumonia #1	Pneumonia #2
Time period					
Vignette answered in baseline	112 (70%)	27	28	27	30
Vignette answered in round 2	48 (30%)	13	14	12	9
Doctor's place of work					
Doctors working in private clinic	64 (40%)	6	9	24	25
Doctors working in public hospital	96 (60%)	34	33	15	14
..of which working in 'access' site	33	13	11	5	4
..of which working in 'bonus' site	39	12	13	8	6
..of which working in 'control' site	24	9	9	2	4
Gender and age					
Vignette answered by female doctor	103 (64%)	24	29	25	25
Vignette answered by male doctor	57 (36%)	16	13	14	14
Average age of doctor	42	40	42	43	43
Full sample	160 (100%)	40	42	39	39

Note: 2 doctors moved from the private to public sector between the baseline and the 2nd round.

5.3.1 Insufficient care: extent, consequences and determinants

Univariate analysis

For the majority of doctor-patient interactions, less than half of the recommended essential treatment plan was given. In 30 vignettes (19%), doctors gave less than 25% of the essential treatment plan; in 86 vignettes (54%), doctors gave less than 50%. In only 8 doctor-patient interactions (5%) was fully sufficient treatment given. The average (mean) percentage of the essential treatment plan given was 50%, the median 44%, with a standard deviation of 24%.

Table 5.6: Too little care? Percentage of essential treatment plan given

Percentage of essential treatment plan given	n	%
-[a] Gave <25% of essential treatment plan	30	19%
...of which gave <i>none</i> of essential treatment plan	(4)	(3%)
-[b] Gave 25-49% of essential treatment plan	56	35%
-[c] Gave 50-74% of essential treatment plan	31	19%
-[d] Gave >= 75% of essential treatment plan	43	27%
...of which gave <i>all</i> of essential treatment plan	(8)	(5%)
Total:	160	100%

Disaggregated by category, results show that the majority of treatment plans were characterised by insufficient advice, monitoring and medication (see table 5.7). In particular, 111 vignettes (69%) were characterised by doctors giving insufficient advice, 118 (74%) by doctors not adequately monitoring the patient, and 116 (73%) by doctors giving insufficient medication. In a lower proportion of vignettes (17%), doctors failed to hospitalise a patient when hospitalisation was required.

Table 5.7: Too little care? Essential treatment plan, disaggregated by category

Treatment category	Expected cost	Doctors giving insufficient care		Average % of treatment category given
		n	%	
Hospitalisation*	Medium-High	7	17%	83%
Medication (drugs, IV fluid, ORS)	Low-Medium	116	73%	56%
Monitoring of condition by doctor	Low-Medium	118	74%	49%
Advice on homecare / Supplements	Low	111	69%	40%

*only required for 1 of the 4 clinical vignettes used.

Not giving any individual part of the essential treatment plan always had potentially negative health consequences. Often, this would be likely to have serious health consequences, as table 5.8 shows. For instance, in 126 doctor-patient interactions (79%) part of an essential treatment plan was not given that would have ‘definitely harmful’ consequences for the patient; 104 (65%) of these would also cause a ‘severe adverse event’.

Table 5.8 Negative health consequences of insufficient care

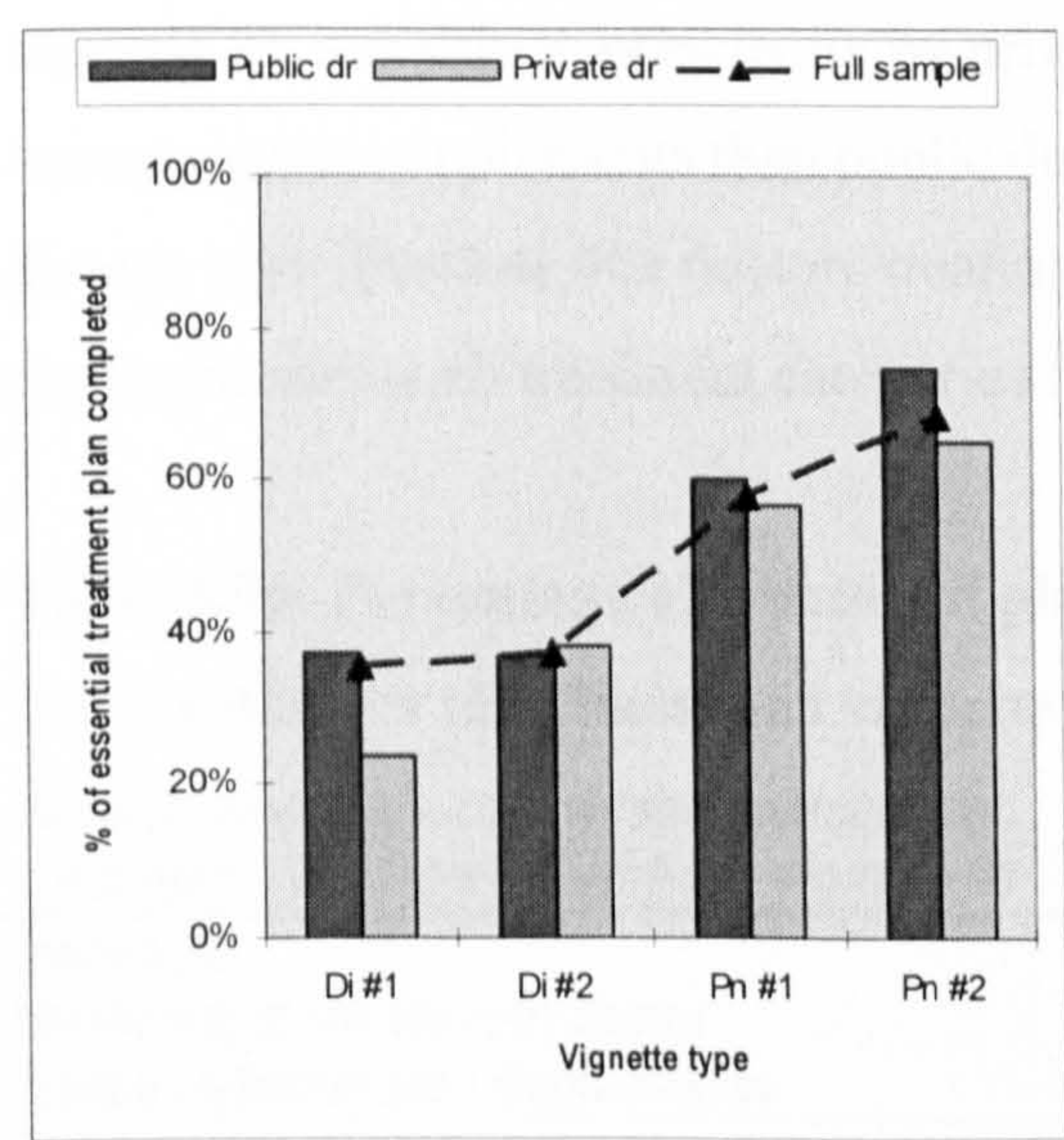
Did not give <i>at least 1</i> part of essential treatment plan that is:	n	%
Possibly harmful	82	51%
- mild adverse event	82	51%
- moderate adverse event	0	0%
- severe adverse event	0	0%
Probably harmful	57	36%
- mild adverse event	0	0%
- moderate adverse event	57	36%
- severe adverse event	0	0%
Definitely harmful	126	79%
- mild adverse event	0	0%
- moderate adverse event	72	45%
- severe adverse event	104	65%
Harmful (total)	152	95%

Note: some doctors did not give more than 1 part of the essential treatment plan.

Bivariate analysis

Doctors treating diarrhoea patients gave a lower percentage of the essential treatment plan than those treating pneumonia patients (36% V 63%, p -value<0.0001). Although public doctors gave, on average, less sufficient care than private doctors, this result was driven entirely by disease type. That is, the majority of private doctors were randomly assigned to one of the two pneumonia vignettes used in this analysis (50 of 64 doctor-patient interactions), whereas public doctors more commonly answered one of the two diarrhoea vignettes (64 of 96). Figure 5.2 clarifies that disease type is more important than public/private differences, by comparing public and private doctors across each of the four clinical vignettes.

Figure 5.2: Average percentage of essential treatment plan completed - public V private doctors, by clinical vignette



After controlling for vignettes, there was no statistical difference in the sufficiency of care given by public versus private doctors other than for diarrhoea vignette #1, where *public* doctors were closer to meeting the complete essential treatment plan (38% V 24%, p -value=0.0403).

Instead, differences between vignettes were more important predictors of the percentage of essential treatment plans completed than public/private differences, with doctors treating diarrhoea patients giving less sufficient care than those treating pneumonia patients. More specifically, doctors answering either diarrhoea vignette gave a significantly lower percentage of the essential treatment plan than those answering pneumonia vignette #1 or #2 (in all cases, p -value<0.0001). Doctors answering pneumonia vignette #2 gave a higher percentage of the essential treatment plan than those answering pneumonia vignette #1 (69% V 58%, p -value=0.0209). There was no statistical difference in the sufficiency of care between the two diarrhoea vignettes.

Disaggregation by category provides some further insights. It shows that the difference in sufficiency of care between public and private doctors for diarrhoea vignette #1 was driven principally by private doctors giving less essential advice on homecare and supplements than public doctors (table 5.9a). Comparisons by vignette disease type illustrate that doctors treating diarrhoea patients gave less sufficient treatment across all treatment categories (table 5.9b).

Table 5.9a: Percentage of treatment plan completed, by category: public V private doctors (for diarrhoea vignette #1)

<i>Average percentage of essential treatment plan completed, by category: Diarrhoea vignette #1</i>	Public doctors (n=34)	Private doctors (n=6)	Difference: p-value
Medication	56%	56%	0.4875
Monitoring of condition by doctor	32%	17%	0.1488
Advice on homecare / Supplements	26%	4%	0.0181
<i>Total</i>	38%	24%	0.0403

Table 5.9b: Percentage of treatment plan completed, by category: diarrhoea V pneumonia

<i>Average percentage of essential treatment plan completed, by category</i>	Diarrhoea (n=82)	Pneumonia (n=78)	Difference: p-value
Medication	30%	69%	<0.0001
Monitoring of condition by doctor	20%	60%	<0.0001
Advice on homecare / Supplements	47%	66%	0.0001
<i>Total</i>	36%	63%	<0.0001

5.3.2 Unnecessary care: extent, consequences and determinants

Univariate analysis

Approximately three-quarters of the sample (74%) gave non-essential care. This ranged from 1 to 5 additional treatments, with a mean of 1.39, median of 1 and standard deviation of 1.24.

Table 5.10: Too much care? Number of non-essential treatments given

Number of non-essential treatments given	n	%
Did not give non-essential treatments	41	26%
Gave 1 or more non-essential treatments	119	74%
- gave 1 non-essential treatment	60	38%
- gave 2 non-essential treatments	29	18%
- gave 3 non-essential treatments	17	11%
- gave 4 non-essential treatments	11	7%
- gave 5 non-essential treatments	2	1%

Disaggregating non-essential treatments by category provides some further insights into the expected cost implications. Of the 118 cases where hospitalisation was *not* needed, in 40 vignettes (34%) doctors recommended hospitalisation. Doctors also frequently gave non-essential drugs, particularly antibiotics (75 doctor-patient interactions) and antihistamines or expectorants (34 doctor-patient interactions). Table 5.11 provides further details of the type of non-essential care given to patients.

Table 5.11: Too much care? Type of non-essential treatments given

Treatment category	Expected cost	Doctors giving non-essential care n	%
Hospitalisation ^a	Medium-High	40	34% ^a
Medication: Antibiotics ^b	Low-Medium	75	47% ^b
Medication: Antiemetic (metoclopramide)	Low-Medium	8	5%
Medication: Bronchodilators	Low-Medium	7	4%
Medication: Antihistamine/Expectorant	Low-Medium	34	21%
Medication: Antipyretics (paracetamol) ^c	Low	12	29% ^c
Medication: Other drugs	Low-Medium	6	4%
Supplements	Low	12	8%
Medication/Advice : Other (not drugs)	Low	11	7%

^a required for 1 of the 4 clinical vignettes analysed. Not required for 118 doctor-patient interactions.

^b cotrimoxazole or amoxicillin required for 1 of the 4 clinical vignettes analysed. Antibiotics included here indicate that doctor gave antibiotics that were not required.

^c required for 3 of the 4 clinical vignettes analysed. Not required for 42 doctor-patient interactions.

In terms of expected health consequences, for 23 vignettes (14%) doctors gave non-essential treatments that were potentially harmful to patients; although none of these had ‘definitely harmful’ health consequences. 14 doctor-patient interactions (9%) were characterised by doctors giving non-essential treatments that had potentially positive health effects. More often, doctors gave non-essential treatments that were health neutral (108 doctor-patient interactions, equal to 69% of the sample). Antibiotics were given unnecessarily in 75 vignettes (47%), with 11 of these 2 different courses of antibiotics were given, and in 1 vignette the doctor giving 3 antibiotics.

Table 5.12a: Non-essential treatments – harmful, neutral or beneficial to patients?

Gave <i>at least</i> 1 treatment that is:	n	%
Harmful to patient	23	14%
- possibly harmful	14	9%
- probably harmful	10	6%
- definitely harmful	0	0%
Health neutral	108	68%
Beneficial to patient	14	9%
- possibly beneficial	7	4%
- probably beneficial	3	2%
- definitely beneficial	6	4%

Note: 119 doctors gave 1 (or more) non-essential treatments.

Table 5.12b: Unnecessary antibiotic use

Number of different antibiotic types given	N	%
Did not give antibiotics (unless required)	85	53%
Prescribed 1 course of antibiotics	63	39%
Prescribed 2 courses of antibiotics	11	7%
Prescribed 3 courses of antibiotics	1	1%

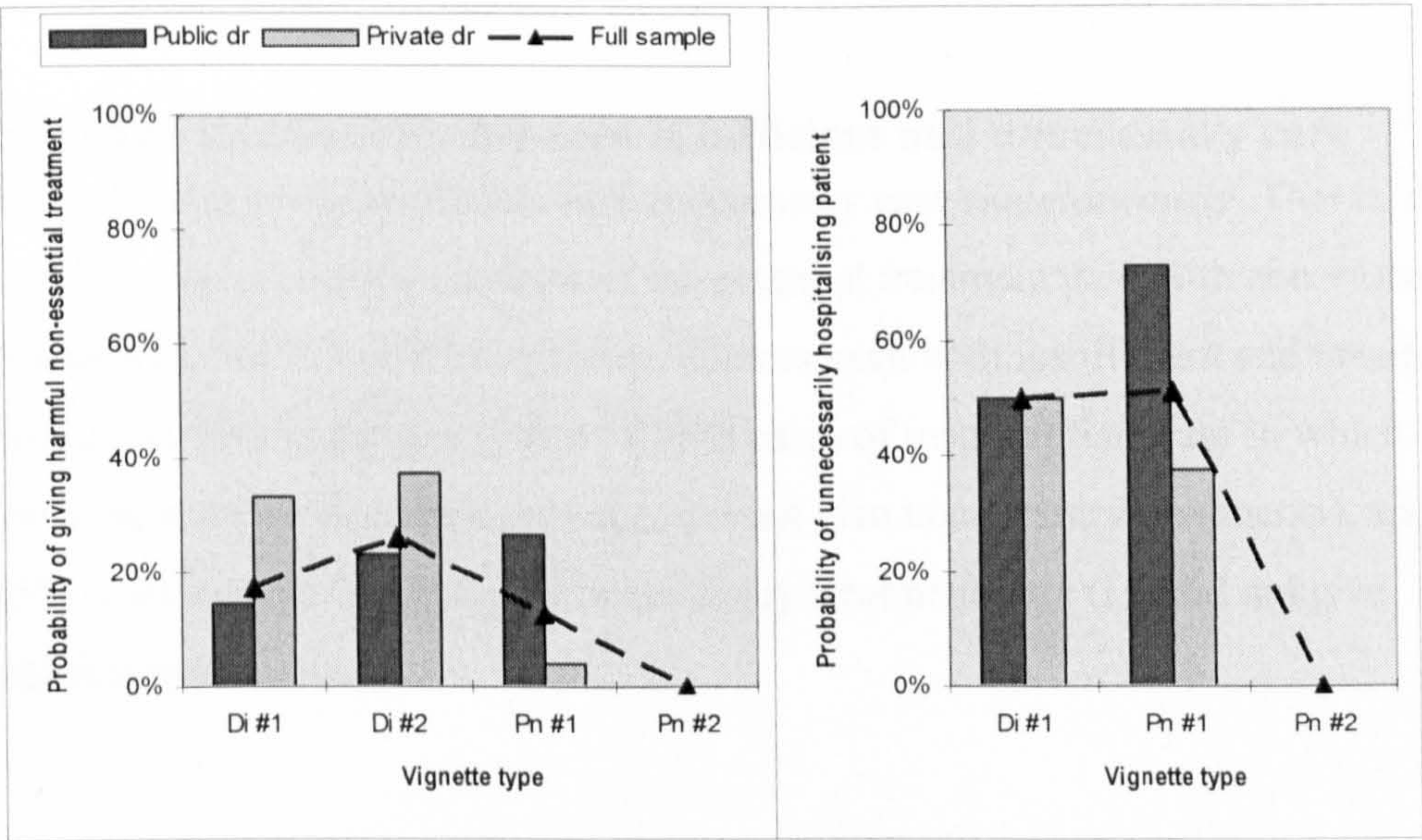
Bivariate analysis

Doctors treating diarrhoea patients were more likely than those treating pneumonia patients to give harmful non-essential treatments (22% V 6%, *p*-value=.0024) and unnecessarily hospitalise patients (50% V 26%, *p*-value=.0039). Indeed, for

pneumonia vignette #2, no doctor gave harmful non-essential treatments or unnecessarily hospitalised patients.

Figure 5.3 compares public and private doctors across each of the clinical vignettes. Figure 5.3a shows that public doctors were more likely to give harmful non-essential treatments for pneumonia vignette #1 (27% V 4%, p -value=.0209), but somewhat less likely to give harmful non-essential treatments than private doctors for each of the diarrhoea vignettes (15% V 33% and 24% V 38%, though p -values>.1). Figure 5.3b shows that public doctors were more likely than private doctors to unnecessarily hospitalise patients for pneumonia vignette #1 (73% V 38%, p -value=.0248), but no differences between public and private doctors for other vignettes.

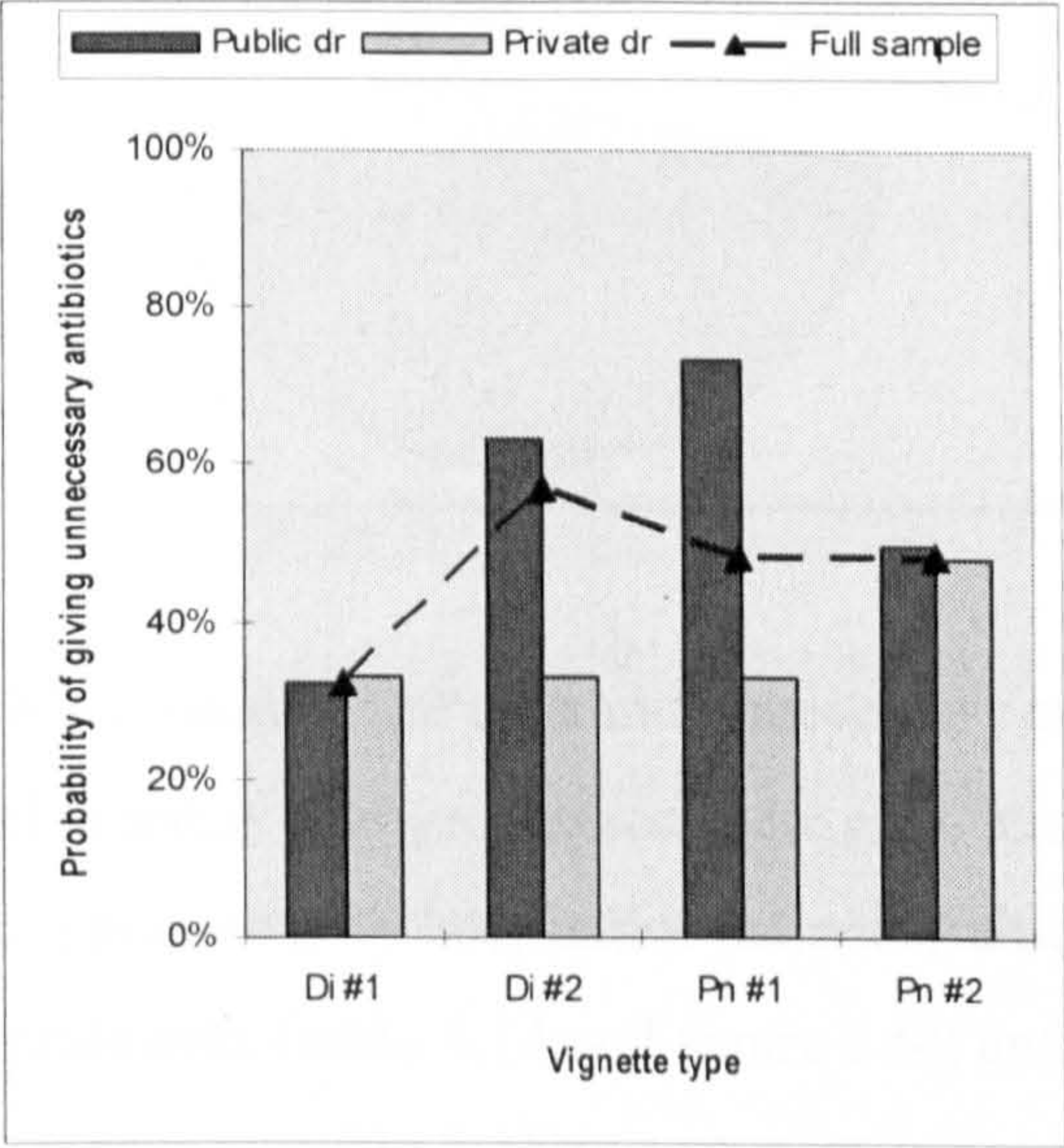
Figure 5.3: Comparison of public V doctors, by clinical vignette
Probability of (a) giving harmful non-essential treatment, (b) unnecessarily hospitalising patient



However, more systematic differences between public and private doctors emerge in unnecessary antibiotic use, as illustrated in Figure 5.4. Public doctors were more likely than private doctors to recommend unnecessary antibiotics to patients for

diarrhoea vignette #2 (64% V 33%, p -value=.0542) and pneumonia vignette #1 (73% V 33%, p -value=.0071). Differences between unnecessary antibiotic use for pneumonia and diarrhoea cases, though, were not statistically significant.

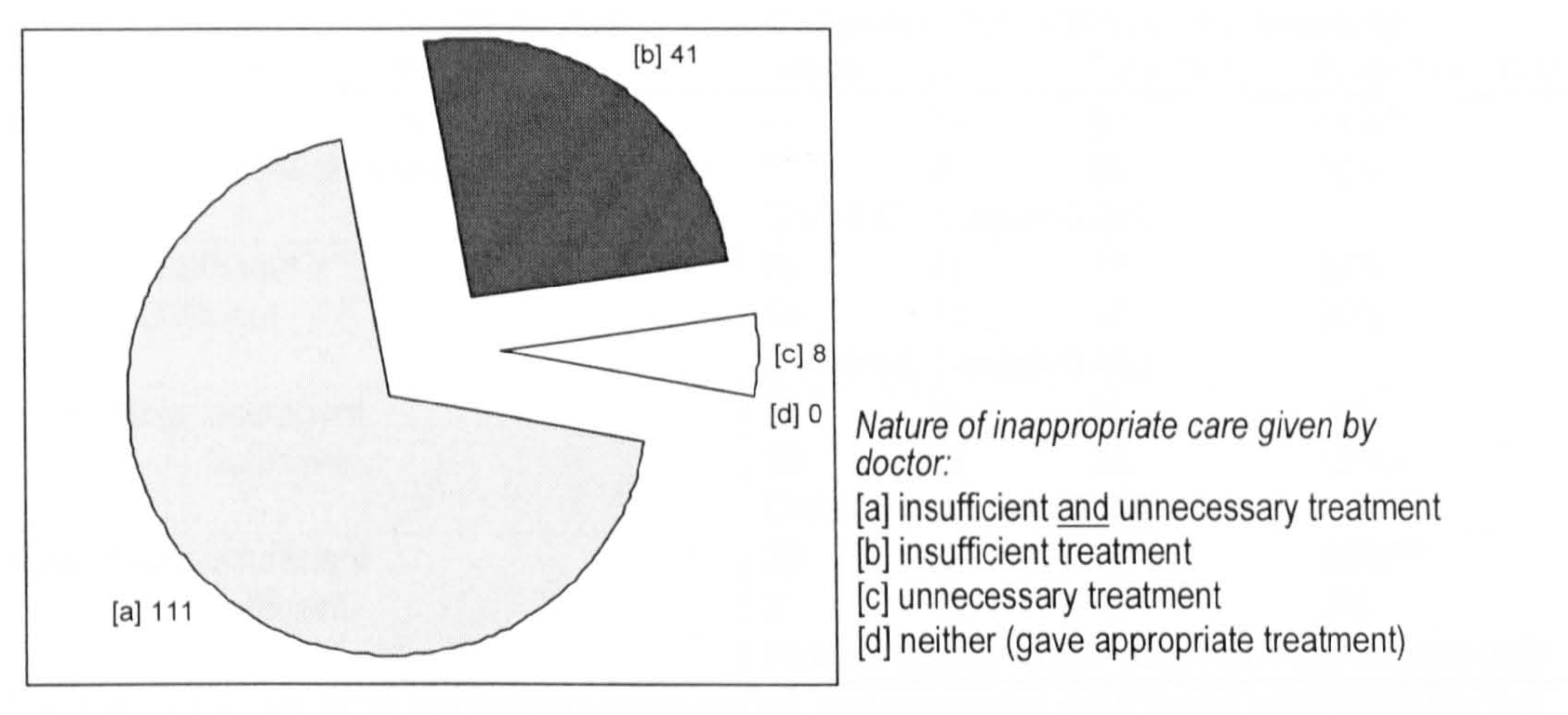
Figure 5.4: Public V private doctors’ unnecessary antibiotic use, by vignette



5.3.3 The relationship between insufficient and unnecessary care

Most doctors gave insufficient and unnecessary care *simultaneously*. That is, doctors typically replace needed aspects of the essential treatment plan with non-essential treatments. For 111 (69%) vignettes, doctors gave both insufficient and unnecessary treatment. This compares with 41 (26%) cases of inappropriate care in which doctors gave insufficient treatment only (i.e. did not give unnecessary treatments), and 8 (5%) cases where doctors gave unnecessary treatment only (i.e. did not give insufficient treatment).

Figure 5.5 Nature of inappropriate care: too little, too much or both?



When insufficient care and unnecessary care are disaggregated, distinct distributions of practice emerge. Doctors who gave less sufficient care were typically more likely to unnecessarily hospitalise patients (table 5.13) and give harmful non-essential treatments (table 5.14 and figure 5.6); and less likely to give beneficial non-essential treatments (table 5.15b).

More precisely, the probability of unnecessarily hospitalising a patient was higher for doctors who gave less than half of the essential treatment plan as compared with those giving more than half (44% V 26%, p -value=.035). Similarly, unnecessary hospitalisation was more likely for doctors who gave insufficient as compared with sufficient medication (50% V 2%, p -value<0.001).

Table 5.13 Sufficiency of care and probability of unnecessary hospitalisation

<i>Sufficiency of essential treatment plan given (general and by category)</i>	<i>Was patient hospitalised unnecessarily?</i>			
	Yes (40)	No (78)	Total (118)	Proportion=Yes
General: gave <50% of ess. treatment plan	23	29	52	44%**
	17	49	66	26%
	Chi²=4.43; p-value=0.035			
Advice: insufficient	26	45	71	37%
	14	33	47	30%
	Chi²=0.59; p-value=0.443			
Monitoring: insufficient	24	56	80	30%
	16	22	38	42%
	Chi²=1.68; p-value=0.194			
Medication: insufficient	38	38	76	50%***
	2	40	42	2%
	Fisher's exact $p<0.001$ (Chi²=24.71; p-value<0.001)			

Note: Fisher's exact test, rather than Pearson's chi-squared test, used when sample size of any cell in 2x2 table is less than 10 (i.e. for Medication 2x2 table).

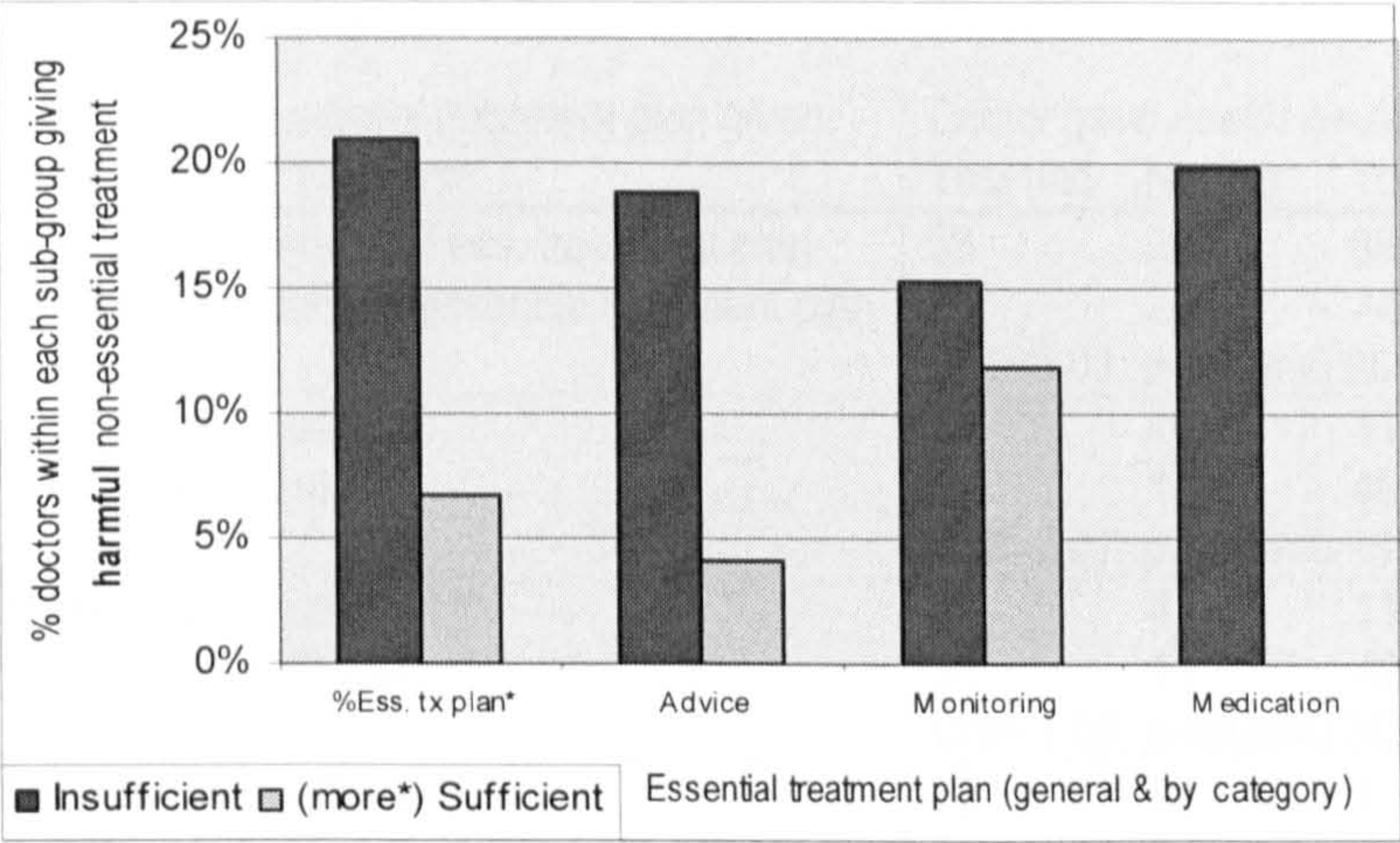
The probability of giving harmful non-essential treatments was higher for doctors who gave less than half of the essential treatment plan as compared with those giving more than half (21% V 7%, p -value=0.009). Similarly, the likelihood of giving harmful non-essential treatments was higher for doctors who gave insufficient as compared with sufficient advice (19% V 4%, p -value=0.009), and insufficient versus sufficient medication (20% V 0%, p -value<0.001).

Table 5.14: Sufficiency of care and probability of giving harmful non-essential treatment

<i>Sufficiency of essential treatment plan given (general and by category)</i>	<i>Doctor gave harmful non-essential treatment?</i>			
	Yes (23)	No(137)	Total (160)	Proportion=Yes
General: gave <50% of ess. treatment plan	18	68	86	21%***
	5	69	74	7%
	Fisher's exact $p=0.009$ (Chi²=6.49; p-value=0.011)			
Advice: insufficient	21	90	111	19%***
	2	47	49	4%
	Fisher's exact $p=0.009$ (Chi²=6.08; p-value=0.014)			
Monitoring: insufficient	18	100	118	15%
	5	37	42	12%
	Fisher's exact $p=0.403$ (Chi²=0.28; p-value=0.595)			
Medication: insufficient	23	93	116	20%***
	0	44	44	0%
	Fisher's exact $p<0.001$ (Chi²=10.19; p-value<0.001)			

Note: Fisher's exact test, rather than chi-squared test, used when sample size of any cell in 2x2 table is less than 10.

Figure 5.6 Probability of doctor giving harmful non-essential treatment



There were no clear correlations between sufficiency of care and the probability of doctors giving health neutral non-essential treatments. Conversely, the probability of giving beneficial non-essential treatments was positively related to sufficiency of care. Doctors who gave less than half of the essential treatment plan were less likely to give beneficial non-essential treatments as compared with those giving more than half (5% V 14%, p -value=0.044). Similarly, the likelihood of giving beneficial non-essential treatments was lower for doctors who gave insufficient as compared with sufficient advice (6% V 14%, p -value=0.093), and insufficient versus sufficient medication (5% V 18%, p -value=0.014).

Table 5.15a: Sufficiency of care & probability of giving health neutral non-essential treatment

<i>Sufficiency of essential treatment plan given (general and by category)</i>	<i>Doctor gave health neutral non-essential treatment?</i>			
	Yes(108)	No (52)	Total (160)	Proportion=Yes
General: gave <50% of ess. treatment plan	58	28	86	67%
	50	24	74	68%
	Chi ² <0.01; p-value=0.986			
Advice: insufficient	71	40	111	64%
	37	12	49	76%
	Chi ² =2.07; p-value=0.151			
Monitoring: insufficient	77	41	118	65%
	31	11	42	74%
	Chi ² =1.03; p-value=0.309			
Medication: insufficient	78	38	116	67%
	30	14	44	68%
	Chi ² =0.01; p-value=0.910			

Table 5.15b: Sufficiency of care & probability of giving beneficial non-essential treatment

<i>Sufficiency of essential treatment plan given (general and by category)</i>	<i>Doctor gave beneficial non-essential treatment?</i>			
	Yes (14)	No(146)	Total (160)	Proportion=Yes
General: gave <50% of ess. treatment plan	4	82	86	5%
	10	64	74	14%**
	Fisher's exact p=0.044 (Chi ² =3.91; p-value=0.048)			
Advice: insufficient	7	104	111	6%
	7	42	49	14%*
	Fisher's exact p=0.093 (Chi ² =2.71; p-value=0.100)			
Monitoring: insufficient	10	108	118	8%
	4	38	42	10%
	Fisher's exact p=0.527 (Chi ² =0.04; p-value=0.836)			
Medication: insufficient	6	110	116	5%
	8	36	44	18%**
	Fisher's exact p=0.014 (Chi ² =6.76; p-value=0.009)			

Note: Fisher's exact test, rather than chi-squared test, used when sample size of any cell in 2x2 table is less than 10.

5.4 Discussion

5.4.1 Main findings

Judged against vignettes, doctors typically provided too little care and too much care simultaneously. That is, the relationship between quality and quantity of care is not two-dimensional. This implies there is not an ‘optimal’ amount of care reflecting maximum quality of care, below which care is too little, and above which care is too much. Instead, doctors are replacing needed aspects of an essential treatment plan with non-essential treatments.

Indeed, in only 5% of the vignettes analysed in this chapter did doctors provide the complete essential treatment plan. Not giving part of an essential treatment plan was always expected to have negative health consequences, and in 65% of vignettes such insufficient care was adjudged by a panel of physicians to result in the patient suffering a severe adverse event (hospitalisation or life-threatening). Moreover, the essential treatments not given were most often only low to medium cost items. Thus moving from insufficient to sufficient care is not that costly in terms of required health inputs. Still, this does not account for the non-trivial cost associated with changing a doctor’s behaviour.

Unnecessary care was also widespread. In 74% of vignettes, doctors gave one or more non-essential treatments. These were particularly costly when doctors unnecessarily hospitalised patients, which occurred 34% of the time. The health implications of unnecessary care, though, were less harmful as compared with insufficient care, most often being health neutral. That is, unnecessary care most often reflected “flat-of-the-curve” medicine, healthcare that is not harmful but equally provides no incremental benefit to the patient (Fuchs 2004). Still, doctors recommended potentially harmful non-essential treatments in 14% of vignettes. Further, doctors frequently prescribed antibiotics unnecessarily. Although these were rarely harmful to the patient, overuse of antibiotics is a public health concern because it can lead to higher antibiotic resistance in the community (Kunin 1993).

Unnecessary hospitalisation also increases the risk of individuals suffering nosocomial infections within the hospital.

For both insufficient and unnecessary care, disease type was generally a more important determinant than whether the doctor worked in the public or private sector. Doctors treating diarrhoea patients provided less sufficient care, and were more likely to provide harmful or costly non-essential care, as compared with doctors treating pneumonia patients. However, public doctors were more likely than private doctors to unnecessarily recommend antibiotics to patients.

Finally, clear patterns of inappropriate care emerge when comparing insufficient and unnecessary care. In particular, doctors providing the least sufficient care are also the most likely to give harmful and costly non-essential treatments. For instance, doctors who gave insufficient advice on homecare and supplements were much more likely to give harmful non-essential treatments than doctors who gave sufficient advice (19% V 4% probability of giving harmful non-essential treatments). Similarly, 20% of doctors who prescribed insufficient medication also gave harmful non-essential treatments, whereas none of the sampled doctors who prescribed sufficient medication also gave harmful non-essential treatments.

5.4.2 Limitations of analysis

In addition to the limitations inherent in clinical vignettes (discussed in section 2.2.4 of the literature review), this chapter's application of vignettes also had its own specific limitations. First, only one dimension of care – a doctor's recommended treatment plan – was analysed. This is in contrast to other clinical vignette studies that analyse multiple dimensions of care. Still, a doctor's treatment plan is the most relevant dimension for analysing costly and potentially harmful consequences of overprovision, and consequently the relationship between quality and quantity of care.

A second limitation is that measures of the overall extent of both insufficient and unnecessary care were simple aggregates (the percentage of the essential treatment plan or number of unnecessary treatments given). Other vignette studies use expert panels (Peabody *et al.* 2000) or item response theory (Das and Hammer 2005b) to weight doctor's responses. Then again, although there was no weighting of individual items as contributors to a single vignette score, the expected health and cost consequences of these individual items were evaluated.

Third, after disaggregating data to conditions and the sector a doctor works in, cell sizes are small. This limited multivariate analyses of the determinants of insufficient and unnecessary care.

More generally, quantity of care as measured by vignettes was used as the empirical measure of medical effort. Whilst vignettes allow both cognitive and physical aspects of effort to be accounted for in a doctor's recommended treatment plan, a limitation is that doctors did not actually have to undertake these physical aspects (rather, they described the physical aspects of effort they would do). There is no basis for judging whether actual practice is likely to be characterised by more unnecessary care and/or less sufficient care.

5.4.3 Links to incentives

By analysing the adverse health and cost consequences of insufficient and unnecessary care, these vignette results also provide a quality perspective to analysis in the next chapter on the impact of supply-side incentives on hospital care. The following chapter, as part of the analysis, classifies diarrhoea and pneumonia paediatric inpatients as receiving less than the standard inpatient package or (at least) the standard inpatient package. However, receiving less than this inpatient package did not always equate to lower quality care because of the potential for doctors to misdiagnose patients (see section 6.2.2 in the next chapter for further details).

Vignette results in this chapter cannot clarify when receiving less than this inpatient package in the next chapter is likely to equate to worse (or better) quality care than

receiving at least the inpatient package. Indeed, vignette results caution against inferring that more care always equates to better (or worse) quality healthcare, because of the complex relationship between quality and quantity of care. But they can provide some insights on the type of poor quality healthcare patients are most at risk of encountering.

Interpreting vignette results literally, for patients incorrectly receiving the standard inpatient package (i.e. misdiagnosed patients), the most likely negative consequence is purely cost-related, since vignettes showed that unnecessary care more often had neutral than adverse health outcomes. That is not to imply there is no risk of adverse health outcomes: in 14% of cases, doctors recommended potentially harmful treatments. However, this interpretation assumes that the patient does not have another serious illness unrelated to either diarrhoea or pneumonia. Conversely, patients incorrectly receiving less than the inpatient package do not spend more than they need to on healthcare (at least initially¹³). However, they are much more likely to suffer an adverse health event than patients incorrectly receiving the standard inpatient package.

These insights provide general quality implications for analysis of incentives in the following chapter. For instance, PHIC insured patients are not only more likely to receive more care than the non-insured. They are also at less risk of suffering adverse health outcomes, but more at risk of receiving costly medicine that has no incremental health benefit (with the converse holding true for the non-insured). More generally, the incentive to provide more care to certain patients, whilst not guaranteeing better clinical quality because of the possibility of flat-of-the-curve medicine, does seem to reduce the risk of a patient experiencing adverse health outcomes.

¹³ In the longer term, patients could spend more on healthcare as a consequence of worse health outcomes. But during this specific hospital visit, they do not spend more than they need to.

However, this application of vignette results to findings in the following chapter need to be qualified, since vignettes are based on hypothetical rather than actual healthcare scenarios. When doctors are asked in a vignette how they would care for a patient, their answers are based on the implicit assumption that there are no significant resource constraints. That is, vignettes can be understood as reflecting a situation where all essential health inputs are available. This provides an incentive for a doctor to err on the side of caution, and may explain why so many doctors recommended non-essential treatments that were health neutral. Doctors may have been aware that such treatments were not essential, but still suggested them because they thought these treatments could have some kind of marginal benefit for the patient and at worst were not harmful to the patient. In contrast, healthcare given by doctors in the previous chapter is constrained by the limited resources they have, time constraints and the knowledge that patients cannot always pay for a comprehensive treatment plan.

Notwithstanding these issues, this chapter shows that whilst the relationship between medical effort and quality is not straightforward, low effort (as empirically measured in this chapter) does typically result in lower quality care, and is more of a quality concern than too much effort. In contrast, unnecessary care (too much effort) has less adverse health impacts on the patient, though it remains a concern for policymakers because it can be costly and due to the potential public health concern of antibiotic overuse.

Chapter 6: Public hospital care: equal for all or equal for some?

6.1 Introduction

In LIC and LMIC settings, government budgets are rarely sufficient to cover a public hospital's operating costs. Shortfalls are typically financed through a combination of health insurance contributions, user charges and other income-generating mechanisms (English *et al.* 2006). The conceptual framework in chapter 3 demonstrated how the mixed nature of this financing arrangement can create perverse incentives to differentiate between patients for reasons other than health need, though effective monitoring and various non-financial factors were also shown to influence a doctor's behaviour. In this chapter, related hypotheses derived from the conceptual framework are tested.

A mix of funding sources is apparent in Philippine public hospitals. Although the majority of funding comes from budgets financed publicly by LGUs, like other hospitals in LIC and LMIC settings, these are not sufficient to cover their operating costs (Department of Health 2005). Public hospitals are therefore reliant on additional income-generating mechanisms, namely PHIC contributions and user charges. As a consequence of such a mixed financing arrangement, the amount paid by patients for healthcare can differ considerably, both within and across public district hospitals.

Patients using public hospitals in the Philippines are charged by line item (e.g. for medicines, laboratory services and other medical procedures used, type of consultations). That is, it is a fee-for-service based system. For PHIC insured patients, these charges are reimbursed by PHIC up to pre-specified limits for various medical benefits. The patient pays the excess if the bill is above these limits.

PHIC, though, does not yet provide universal population coverage. For the uninsured, hospital charges are paid out-of-pocket. However, there are reductions or exemptions from charges for the poorest patients. Such discounts are based on a patient's ability to pay, as determined by hospital social workers, with these discounts financed by the hospital itself (Capuno 2006). Patients' health expenditures also differ in the amount paid for room and board. This depends on the type of ward a patient is admitted in. Wards vary in terms of hotel amenities, but the healthcare provided in each is meant to be of equal technical quality. In addition to standard ('Charity') wards, public hospitals often have separate, less crowded (sections of) ward/s for the insured and those choosing to pay extra for this privilege ('Pay' or 'Medicare' wards), and occasionally private rooms (Gertler and Solon 2002). The exact number and type of wards, though, varies across public hospitals, as do the charges for each ward type. Consequently, the amount patients have to pay can vary considerably.

The financial incentives for doctors to differentiate between patients, though, are diluted by the fact that it is the LGU which has official discretion over the extent to which public hospitals can retain revenues generated from health insurance or user charges. Moreover, healthcare given by some public doctors are formally monitored through internal and/or external monitoring mechanisms. Further, the intensity of these financial incentives is likely to be lower for the actual physicians interacting with patients, since the majority of a public physician's income is salary-based. Still, most public hospital physicians receive professional fees for insured patients from PHIC. For example, 85% of physicians across 30 public hospitals in the Philippines received PHIC fees (source: QIDS dataset, 2006). This implies that, at least for insured patients, most public physicians also face direct incentives to differentiate between patients for financial reasons.

This chapter explores how this incentive structure within which public hospital doctors operate affects the medical effort doctors exert on patients. Analysis is based

on assessment of the determinants of the amount and type of health services given to hospitalised children aged five or under, diagnosed with pneumonia or diarrhoea. The data used comes from the QIDS study, which was described in chapter 3.

6.2 Methods

6.2.1 Links with hypotheses from conceptual framework

The amount of medical effort a physician exerts on a patient should – under conditions of perfect information or perfect agency – depend only on a patient’s health need. Yet the conceptual framework (see chapter 3) showed how with imperfect information or imperfect agency, a physician faces incentives to differentiate between patients for reasons other than health need, and consequently provide too little or too much healthcare to a patient.

Six hypotheses derived from the conceptual framework are tested in this chapter. These are given in Table 5.1, along with their testable empirical versions. The sufficiency (volume) and appropriateness (type) of health services received are used as empirical measures of medical effort, since medical effort itself is not directly observable. Details on the medical effort measures and empirical proxies used to test hypotheses are given in sections 6.2.2 and 6.2.3 respectively.

Table 6.1: Testable hypotheses

Hypothesis	Empirical proxies
1. Performance-based payments encourage a more appropriate effort level if they are well correlated with e^* .	– Physicians working in QIDS ‘bonus’ hospitals (receiving bonus payments for meeting quality standards) are less likely to provide insufficient and inappropriate care ¹⁴ .
2. More effort will be exerted on patients that a doctor receives a higher financial reward from.	– Patients paying a higher daily rate for room and board are less likely to receive insufficient and inappropriate care. – Physicians working in QIDS ‘access’ hospitals (where there is increased depth and breadth of insurance coverage in the district) are less likely to provide insufficient and inappropriate care.
3. More effort will be exerted on patients from whom a doctor receives a higher non-financial reward.	– Patients coming from wealthier households are less likely to receive insufficient and inappropriate care.
4. More effort will be exerted on patients who are better able to advocate for more care.	– Patients whose mothers have attained higher education levels are less likely to receive insufficient and inappropriate care.
5. Doctors that are effectively monitored will provide a more appropriate effort level.	– Physicians working in hospitals that are externally monitored through Sentrong Sigla accreditation are less likely to provide insufficient and inappropriate care. – Physicians working in hospitals that have internal quality control committees are less likely to provide insufficient and inappropriate care.
6. More effort will be exerted on the insured than the non-insured (independent of the reward a doctor receives from a patient)	– Patients who have (and use) PHIC insurance are less likely to receive insufficient care, but more likely to receive inappropriate care.

6.2.2 Measuring medical effort

Medical effort was defined in chapter 3 as the cognitive and physical activities that are required in caring for a patient. Empirical proxies, though, are necessarily limited to measuring the more observable aspects of medical effort. Given the

¹⁴ Measures of insufficient and inappropriate care are discussed in section 6.2.2.

available data, five measurement types were considered¹⁵. These were based on the sufficiency (volume) or appropriateness (type) of health services received:

- a.* Comparison of individual health services
- b.* Aggregation of health services: summation and weighted summation
- c.* Aggregation of health services: ‘clinical packages’
- d.* Patient perceptions on the volume and type of healthcare received
- e.* Medical administration type

a. Comparison of individual health services

As part of the patient exit survey, the sick child’s parent or other carer was asked which of the following health services the child received during their inpatient admission:

- Laboratory tests
- X-ray
- Oral medication
- Intravenous medication
- Other injected medication (intramuscular or, rarely, intracutaneous)
- Intravenous fluids
- GP visit during admission (after initial visit upon admission)
- Specialist consultation during admission
- Lumbar puncture
- Intubation

Whether or not a patient received each of these services gives simple measures of the volume of health services received. However, such analysis of individual health services does not provide a measure of the overall quantity of health services received, and so does not adequately reflect a doctor’s medical effort. Thus various approaches to aggregating these data were explored instead.

¹⁵ A sixth option could have been to use the disaggregated clinical vignettes from chapter 5. However, such data did not correspond to individual doctor-patient interactions, and this option was therefore not considered.

b. Aggregating health services: summation and weighted summation

- The simplest approach to aggregation is to sum the 10 health services. But this makes the unrealistic assumption that there are no differences in the medical effort required between these health services. For instance, it seems inappropriate to assume that a patient given IV fluids is receiving an equal volume of services to a patient given a specialist consultation.

Applying weights to these health services can potentially provide a more accurate reflection of the overall volume of services provided. For instance, in the resource-based relative value study in the US (Hsiao *et al.* 1988), a wide range of health services were weighted by the time taken, skill required and risk of iatrogenic harm in providing a given health service. This was done so that health providers' pay more accurately reflected the work involved with different health services.

However, there are a number of methodological difficulties associated with weighting that are especially difficult to resolve for this dataset. In particular, assigning the relative importance attached to each weight category; and specifying appropriate functional relationships between weight categories, and between weight categories and health services are problematic to address here as there is insufficient detail known about each patient case. That is, although it is known whether the child was admitted with pneumonia or diarrhoea, details of the child's syndrome, etiology and any secondary diagnosis are not known, all of which are likely to affect the accuracy of the weighting system.

An alternative and simpler approach is to use the prices of health services as weights. Medical effort would then be measured by a patient's health expenditure. This assumes that prices accurately reflect differences in effort exerted by doctors across health services. Of more fundamental concern is that in the public hospitals from which data are drawn, prices charged to patients vary, depending on health insurance status and ward type. These are characteristics of the incentive structure

that this thesis specifically seeks to analyse, making health expenditure analysis unsuitable for the research aim of this thesis.

c. Aggregating health services: ‘clinical packages’

Given the problems associated with summation and weighted summation, an alternative approach to aggregating health services based on ‘clinical packages’ was adopted. This defined broad packages of care for pneumonia and diarrhoea cases. Five clinical packages are specified, based on various combinations of the 10 health services listed in section 6.2.3a. They represent sequentially increasing volume of health services, and are described in table 6.2 below.

Table 6.2: Package details for pneumonia and diarrhoea

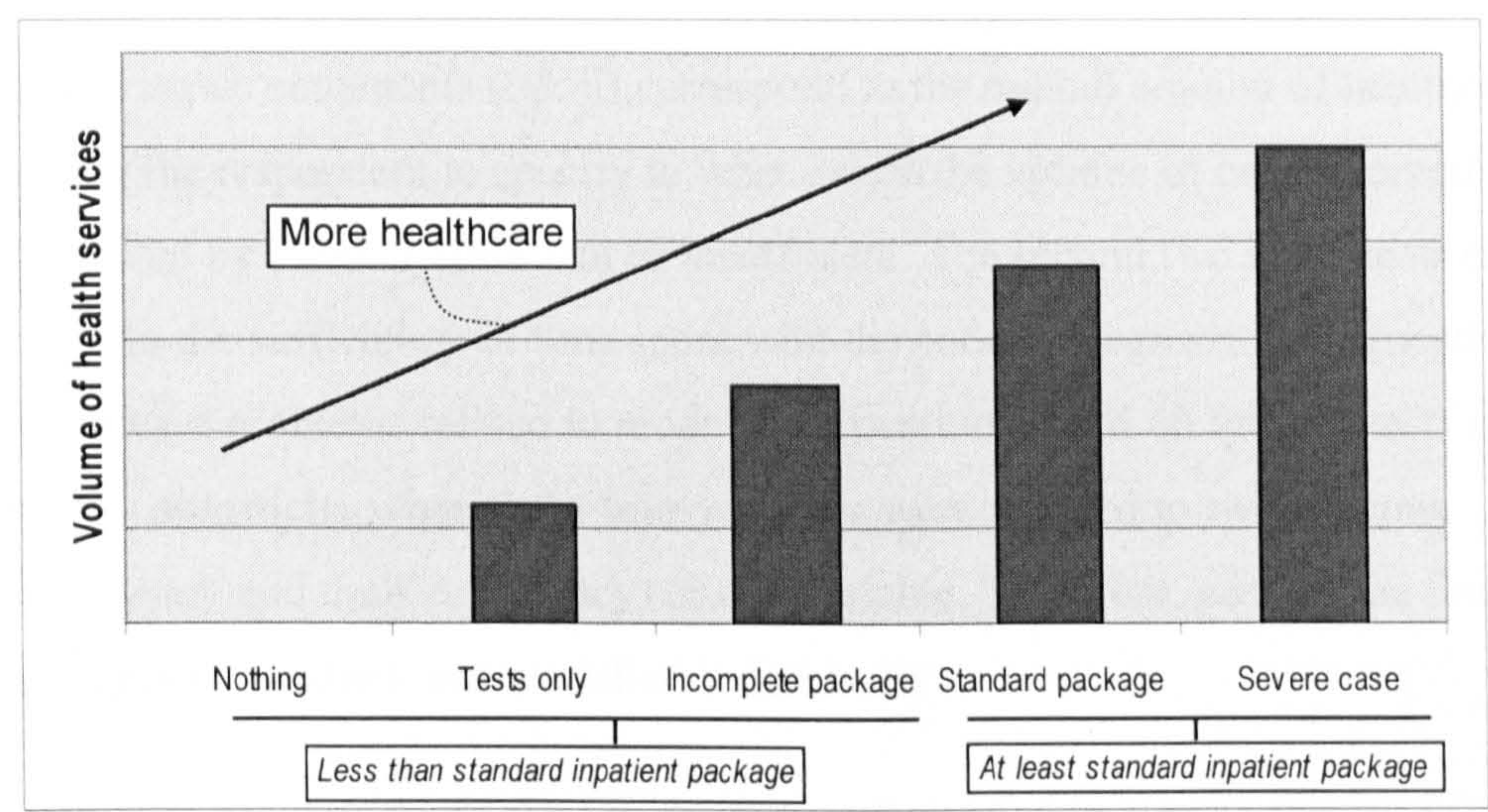
Package category	Pneumonia package contents	Diarrhoea package contents
0 Nothing	-	-
1 Tests only	Lab tests and/or X-ray	Lab tests
2 Incomplete package	Package 1 + only 1-2 of: [a] Medication (oral or IV or other injected) [b] IV fluid [c] Doctor visit during admission (by GP or Specialist)	Same as pneumonia package 2, but excluding X-ray.
3 Standard package	Package 1 + <i>all</i> of: [a] Medication [b] IV fluid [c] Doctor visit during admission	Same as pneumonia package 3, but excluding X-ray.
4 Severe case	Package 3 + lumbar puncture or intubation.	Same as pneumonia package 4 (i.e. including X-ray).

Definition of these packages was based on discussions with local physicians from the Philippines on what constitutes a ‘standard inpatient package’ for pneumonia and diarrhoea paediatric cases, and consequently different packages of ‘non-standard’ care. These are consistent with clinical guidelines giving more specific advice on the diagnosis and treatment of pneumonia and diarrhoea paediatric cases, such as the Integrated Management of Childhood Illnesses (WHO and UNICEF 2005).

The standard package therefore defines a basic set of items needed to provide quality inpatient care. If fewer items are provided, it is reasonable to interpret this as

insufficient – and thus lower quality – care. However, if more than this is provided, it is not possible to ascertain whether this is unnecessary care or instead reflects more severe cases.

Figure 6.1 Clinical packages and insufficient care



It is important to note that determining the first three clinical package categories to be insufficient assumes that the child has been correctly diagnosed and admitted. But if, for instance, an inpatient only has moderate diarrhoea (and so should be seen as an outpatient case), then not receiving medication or IV fluid does not necessarily imply insufficient care. Given a lack of data on the accuracy of diagnosis, results are presented in terms of the quantity of care, with quality judgements left to the discussion.

d. Patient perception variables

These variables provide more qualitative measures of the sufficiency of care, in terms of patient perceptions regarding the amount of care or the time devoted to a patient. A child’s parent or other carer were asked to specify how much they agreed or disagreed (using a standard 5-point likert scale: Strongly Agree, Agree, Uncertain, Disagree, Strongly Disagree) with the following statements:

- i] "I think my doctor has done everything needed to provide complete medical care."
- ii] "When I go for medical care, they are careful to check everything when treating and examining my child."
- iii] "Those who provide my child's medical care sometimes hurry too much when they treat my child."
- iv] "Doctors usually spend plenty of time with my child."

The first two statements (i & ii) correspond to the overall amount of healthcare, asking the respondent to specify to what extent the volume of care received was perceived by them as sufficient or insufficient. The second two statements (iii & iv) relate to the sufficiency of time spent with the patient. Regression diagnostics found significant problems related to model specification (based on the link test) and heteroscedasticity when these four variables were reduced to two (volume sufficiency and time sufficiency) or one variable. Therefore, each of the four perception variables was modelled individually.

e. Medication administration type

This empirical measure involves analysing the method of medical administration given to the sub-sample of patients receiving medication intravenously or by injection. This is because intravenous medication is, for most pneumonia and diarrhoea inpatient cases, preferable to other injected medication in terms of minimising patient discomfort, but is typically more time-consuming.

Intravenous medication is therefore defined as being a more appropriate method of medical administration than other injected medication, and also requires more effort from the doctor. Note that data on whether patients received medication orally was not used as a comparator. This was because it is not evident whether oral administration requires more or less medical effort than intravenous or injected medication, and as a doctor's decision to not administer orally is likely to be driven to a larger extent by the severity of a patient's illness.

Summary

From these various approaches to empirically measuring medical effort, three sets of measures are used in the analysis. These are summarised in Table 6.3.

Table 6.3 Empirical measures of medical effort used in analysis

Medical effort measure	Specification
A. Clinical Packages [CP] <i>Sufficiency of the volume of services given to a patient.</i>	– Whether the package of care received was less than the standard inpatient package (=0) or not (=1). <i>Note: alternative specification using all clinical packages (on an ordinal scale from 0-4) provides an additional measure of volume of services, though this does not evaluate the sufficiency of service volume.</i>
B. Patient Perceptions [PP] <i>Sufficiency of the volume of services and time given to a patient.</i>	– Carer's perception on sufficiency of volume of services given to child (model i & ii, each on 5-point scale) – Carer's perception on sufficiency of time spent with child (model iii & iv, each on 5-point scale). <i>Note: responses were inverted for 3 of 4 measures, so that the value 1 (5) consistently pertained to dissatisfaction (satisfaction).</i>
C. Medication Administration Type [MAT] <i>Appropriateness of care given to a patient.</i>	– Whether child received medication via injection (=1) rather than intravenously (=0). <i>Note: in contrast to the CP and PP measures above, a higher value (1) represents <u>less</u> effort than a lower value (0).</i>

6.2.3 Model specification

The general empirical approach can be summarised as follows:

$$E_i = \beta_i X + \beta_j Y + \mu_{i,j}$$

[1]

where the dependent variable E_i denotes the medical effort patient i receives, as measured through Models A , B and C . In Models A and C , a logit specification is used (since outcomes are binary in nature); in Model B , the specification is ordered logit (since outcomes are ordinal and categorical). Logit and ordered logit specifications were chosen because of the nature of the dependent variables, with linear regression alternatives having inferior statistical properties (Greene 2007).

Explanatory variables are made up of vectors of patient-related characteristics (X) and hospital-related characteristics (Y), with μ_{ij} a vector of residuals. For all model specifications, the approach was to first estimate a full model, which includes the full variable set. Then a restricted model is estimated. This is a reduced (nested) form of the full model, excluding statistically insignificant control variables on the basis of the Akaike Information Criterion (AIC). It reflects the model which best forecasts the dependent variable in each of Models A , B and C beyond the sample set. In the results section, only the restricted model is presented¹⁶. Note that results are based on logistic specifications and are therefore interpreted in terms of their effects on the odds ratio.

To control for case-mix or disease severity, separate regressions are run for patients with pneumonia and those with diarrhoea in Models A and C . In Model B , though, the full sample is used (though dummy explanatory variables for the two illnesses are included). This is because case-mix/disease severity is not expected to be as crucial a determinant of users' perceptions as it is for the actual volume or type of healthcare received.

This model utilises data from two time periods before and after the QIDS intervention. The effects of most of these explanatory variables are expected to be constant over time, and thus are pooled across the two time periods. However, the model also includes two hospital-level policy interventions introduced after the first time period, as part of the QIDS study. The interventions were expanded insurance coverage for children (in 'access' hospitals), and increased reimbursement for providers meeting quality standards (in 'bonus' hospitals). Section 3.3.2 in chapter 3 provides further details on these policy interventions. The effects of the two policy interventions are isolated using a difference-in-difference methodology (see, for instance, Yip and Eggleston 2001):

¹⁶ Full model estimates were consistent to restricted model estimates in the sense that there were no drastic changes in the odds ratios and standard errors of explanatory variables.

$$E_i = \beta_{1,j} Access + \beta_{2,j} Bonus + \beta_{3,i} Time + \beta_{4,i} Access * Time + \beta_{5,i} Bonus * Time + \beta_i X + \beta_j Y + \mu_{i,j} \tag{2}$$

This model is an expanded form of the more generalised regression model [1] above. *Access* and *Bonus* are dummy variables taking the value 1 if the patient is treated in a hospital with one of these policy interventions; and *Time* is a dummy variable equal to 1 for the second data period. *Access*Time* and *Bonus*Time* are the variables of interest, as they show the impact of the reforms after accounting for time trends. That is, their coefficients β_4 and β_5 measure the difference over time for access or bonus hospitals, as compared with the difference over time for control hospitals (i.e. the difference-in-difference). The interpretation of these and other difference-in-difference coefficients are summarised in table 6.4.

Table 6.4: The difference-in-difference (DD) approach

	QIDS Policy intervention type (hospital-level)		
	Access	Bonus	Control
Before (2003-4, Time = 0)	β_1	β_2	
After (2006-7, Time = 1)	$\beta_1 + \beta_3 + \beta_4$	$\beta_2 + \beta_3 + \beta_5$	β_3
Difference (After minus Before)	$\beta_3 + \beta_4$	$\beta_3 + \beta_5$	β_3
DD (Access or Bonus V Control)	β_4	β_5	

6.2.4 Explanatory variables

The rationale for explanatory variables are based on the conceptual framework, or act as controls for non-incentive related factors that impact upon the medical effort exerted (such as a patient’s severity of illness).

Patient-related variables

The daily charge for a patient’s room and board (*Daily Charge RB*) tests hypothesis 2. Its coefficient is expected to be positive for Models *A* and *B*, and negative for Model *C*, since the financial reward to the health provider is higher for patients paying more. The room and board charge was preferred to using total health expenditure because it is independent of expenditures on actual health services

received (such as medications). Thus, unlike total health expenditure, it is exogenous to all of the dependent variable specifications.

Household income (*HH Income*, using income quintiles) is a proxy for a patient's social standing, testing hypothesis 3. Its coefficient is expected to be positive for Models *A* and *B*, and negative for Model *C*. This is based on potential reciprocity, assuming doctors are more likely to expect future reciprocal gains from patients with a higher income (Fehr and Falk 2002). The type of ward a child is staying in, an arguably more visible measure of social standing, was not used because of non-uniform interpretations of ward types across hospitals.

The education level of a child's mother (*Education*) is a proxy for the ability of a mother to advocate for more effort being exerted in treating her sick child, testing hypothesis 4. Its coefficient is expected to be positive for Models *A* and *B*, and negative for Model *C*.

A variable reflecting whether a patient has, and uses, PHIC insurance (*PHIC insured + claim*) tests hypothesis 6. Its coefficient is expected to be positive for Models *A* and *B*: because the insured are typically able to pay more for healthcare than the non-insured, and due to the potential for ex post moral hazard (see Cutler and Zeckhauser 2000 and the conceptual framework). However, for Model *C* the coefficient is expected to be positive for a different rationale: administering medication by injection is quicker than intravenous administration, yet reimbursement from PHIC is the same either way, and so physicians are likely to prefer administering medication by injection for such patients.

Hospital-related variables

A first set of hospital variables account for the QIDS policy interventions. The 'bonus' intervention (*Bonus*Time*), reflecting bonus payments to the hospital for meeting quality standards, tests hypothesis 1. These bonus payments are anticipated to encourage a more appropriate effort level. Therefore its coefficient is expected to

be positive for Models *A* and *B*, and negative for Model *C*, if one assumes that more medical effort as measured in these models also represents more appropriate effort. The ‘access’ intervention (*Access*Time*¹⁷), indicating expanded insurance coverage in the district, tests hypothesis 2. Its coefficient is expected to be positive for Models *A* and *B*, since doctors are aware that more services will be reimbursed for these patients than before. For Model *C*, the coefficient is unknown a priori.

A second set of variables reflect monitoring of a doctor’s health service delivery, and test hypothesis 5. The variable *Internal Monitoring* indicates that a hospital has a mortality or morbidity review committee, thus providing doctors with information on appropriate care. The variable *External Monitoring* reflects that a hospital was Sentrong Sigla accredited. Such hospitals have to meet structural quality standards to be accredited, and then are monitored to ensure this quality is maintained (Catacutan 2006). In both cases, monitoring is anticipated to encourage a more appropriate effort level. Coefficients are expected to be positive for Models *A* and *B*, and negative for Model *C*, if one assumes (as with hypothesis 1) that more effort as measured in these models also represents more appropriate effort.

Control variables

Variables controlling for a patient’s severity of illness (*Age of Child* variables, # *Symptoms*) are included. Patients with more severe illnesses are expected to receive more health services (relevant to models *A* and *B*), and also more likely to receive medication by injection than intravenously (Model *C*). Note that case-mix is already controlled for by running separate regressions for pneumonia and diarrhoea inpatients in Models *A* and *C*, and in Model *B* by including dummy explanatory variables for the two illnesses.

All other control variables account for a hospital’s technical capacity. These also include physician characteristics averaged at the hospital level (*Ave. Vignette Score*,

¹⁷ Note that an alternative set of interaction dummies based on combining the *Access* dummy with whether a patient had PHIC insurance were also run. These produced near identical results in all model variants.

measuring a physician's clinical ability; and *Ave. Physician Age*). Four variables measure input availability (*Lab services*, *Stethoscopes*, *Otoscopies*, *Sterilizers*). Note also that the coefficient for *External Monitoring* could also be partially reflecting input availability, since Sentrong Sigla accreditation is based on meeting quality standards which include input availability. The number of beds (*# Beds*) provides a general measure of a hospital's capacity to cope with high patient loads. The variable *Caseload* controls for a potential trade-off between the average effort level per patient and the total medical effort exerted at the hospital.

Table 6.5 describes all explanatory variables used in the regression analyses, including further details on these control variables.

Table 6.5 Explanatory variables for regression analyses

Variable	Description	Hypothesis	Model A Expected coefficient	Model B Expected coefficient	Model C Expected coefficient
DIFFERENCE-IN-DIFFERENCE VARIABLES					
Access	Hospital is an 'access' site	Control	0	0	0
Bonus	Hospital is a 'bonus' site	Control	0	0	0
Control	Hospital is a control site	Control	Ref.	Ref.	Ref.
Time	Patient treated in <u>any</u> hospital <u>after</u> policy interventions	Control	0	0	0
Bonus*Time	Patient treated in <u>bonus</u> hospital <u>after</u> policy intervention	1	+	+	-
Access*Time	Patient treated in <u>access</u> hospital <u>after</u> policy intervention	2	+	+	+/-
PATIENT CHARACTERISTICS					
Daily Charge RB	Daily charge for room and board	2	+	+	-
HH Income	Reported annual household income (quintiles used in regressions)	3	+	+	-
Education	Education level of child's mother (range: no education to tertiary)	4	+	+	-
PHIC insured + claim	Patient has PHIC insurance and has claimed / will claim	6	+	+	+
# Symptoms	Number of symptoms before hospitalisation (range 0 to 12)	Control	+	+	-
Treated before	Child treated for condition before being hospitalised	Control	+	+	-
Age of child	Child's age (range: 6 months to 5 years)	Control	+/-	+/-	+/-
HOSPITAL AND PHYSICIAN CHARACTERISTICS					
Internal Monitoring	Hospital has mortality/morbidity review committee	5	+	+	-
External Monitoring	Hospital is Sentrong Sigla accredited	5	+	+	-
Lab services	Number of laboratory services* (range 1-5)	Control	+	+	+/-
Stethoscopes	Number of stethoscopes (range 3 to >=10)	Control	+	+	+/-
Otoscopes	Number of otoscopes (range 0 to 4)	Control	+	+	+/-
Sterilizers	Number of sterilizers (range 0 to 7)	Control	+	+	+/-
# Beds	Number of available beds	Control	+	+	-
Caseload	Number of inpatient cases in last month	Control	-	-	+
Ave. Vignette Score	Average vignette score of interviewed hospital physicians	Control	+	+	-
Ave. Physician Age	Average age of interviewed hospital physicians	Control	+/-	+/-	+/-

*that are needed for pneumonia or diarrhoea

6.2.5 Regression diagnostics

This section performs various diagnostic checks related to the model specified in section 6.2.3. These check for and, if necessary, correct common econometric problems. Unless otherwise stated, references used for this section were Greene 2007; Gujarati 1999; and StataCorp 2007a. The computer programme *Stata* was used for all econometric analyses (StataCorp 2007b).

Data clustering

There is potential clustering of data at the hospital level. This occurs if patients in a particular hospital have some kind of shared characteristics and/or shared influencing factors (that are not captured by existing explanatory variables). Note that there is no separate clustering issue at the physician level, since physician data is averaged at the hospital level. Data clustering is statistically important because it means error terms are not independent; treating them as if they are independent results in estimated standard errors that are too small, increasing the likelihood of rejecting the null hypothesis.

To evaluate if data clustering at the hospital level is likely to be an issue, intraclass correlations were calculated for each model specification. For all models, this correlation was statistically significant at the 99% level. For Model *A* variants (clinical packages), the intraclass correlation was between 0.16-0.2. The respective figures were 0.04-0.22 for Model *B* specifications (patient perceptions) and 0.15-0.19 for Model *C* (medication administration type). Since data clustering was statistically significant, it was adjusted for in the modelling process. In addition to hospital-level explanatory variables, the `cluster` command in Stata was used. This treats observations as independent across clusters/groups (hospitals), but not necessarily within the cluster. Note also that *t* tests undertaken in analysis of clustered data used the `clttest` Stata add-on command (Herrin 2002), and were one-sided unless otherwise stated.

Specification errors

A link test was performed to evaluate model specification (testing both dependent and independent variable specifications). This involves including the square of predicted values as an additional explanatory variable. In all Model *A* variants, no problems were found.

For Model *B* variants, though, the predicted value squared was significant in all cases. Using alternate independent variable specifications did not fix the problem. When each dependent variable was reduced from an ordered logit (with values 1-5) to logit specification (values 1-3 recoded as zero, 4-5 as one), the general model specification problem identified by the link test was resolved. Another rationale for using a logit specification was because observations were strongly concentrated around one value (4, whereby a respondent has a moderately positive perception), and consequently regression results for the ordered logit specifications were very weak.

Specification problems were also identified in Model *C* for the pneumonia sub-sample. As with Model *B*, alternative independent variable specifications failed to remove the problem. However, dependent variable specification is unlikely to be the issue here, since the dependent variable is binary in nature (and using a probit specification did not help). Removing the most influential observation did resolve the problem. See the section on outliers below on the validity of such a solution.

Heteroscedasticity

Heteroscedasticity occurs when the error terms do not have constant variance. It was tested for with a likelihood ratio test – whereby a full model with heteroscedasticity (assuming that one or more of the patient-level explanatory variables is correlated with the residuals) is compared with the same model with homoscedasticity. This uses the `hetprob`¹⁸ Stata extension.

¹⁸ I.e. using a probit specification. Stata did not provide such a command application for a logit specification.

In some model variants (across Models *B* and *C*), evidence of heteroscedasticity was found, most commonly in relation to the number of symptoms variable. However, in most cases this did not noticeably change regression results: all hypothesis-related variables in the heteroscedastic-adjusted probit models had near equivalent coefficients (the same sign and similar magnitude), standard errors and *z* statistics to the homoscedastic models. In the Model *C* pneumonia sub-sample, though, there was one noticeable change in regression results, with the education variable insignificant in the homoscedastic specification but strongly significant in the heteroscedastic specification. Consequently, in this case, heteroscedasticity-adjusted results are presented.

Outliers, Leverage and Influence

To evaluate if any observations substantially changed regression results, the general strategy was to first identify the most ‘influential’ (i.e. variables that are outliers and have high leverage) observations. The diagnostic statistics used to identify such observations were the difference of chi-squares and standardised Pearson residuals. Once identified, each regression model was re-run without the most influential observations, to explore if explanatory variables’ coefficients are sensitive to the removal of such outliers. Note that there are no set definitions on what should be labelled an ‘influential’ observation, but some rule-of-thumb cut-offs have been suggested in the statistical literature (see, for example, Hamilton 2006, page 210). These cut-offs were used, along with re-running each regression model without its most markedly influential observations.

In all models, coefficients and standard errors of explanatory variables were not noticeably different. Further, in all but one of the models, diagnostic statistics did not identify observations that were markedly influential. The one exception was in the pneumonia sub-sample for Model *C*. Here, there was a large jump in the difference of chi-squares for 1 observation: from 116 for the second most influential to 345 for the most influential. Removing this observation did not change the

direction of any significant odds ratios, but the odds ratios of all significant variables became more marked (i.e. moved further away from one). Further, it resolved the model's specification errors. Therefore, regression results presented for this model excluded this outlying observation.

Multicollinearity

To assess if there is high (imperfect) multicollinearity amongst two or more explanatory variables – whereby they are approximately linearly related – the variance inflation factor (VIF) was calculated for each explanatory model across all estimated models. As with 'influential' observations, there is no set cutoff for multicollinearity, but rules of thumb exist to assess if it is likely to be a major problem. For instance, an explanatory variable with a $1/VIF$ value of less than 0.1 (or $VIF > 10$) is often interpreted as being a cause for concern (Chatterjee *et al.* 2000). In all of the regression models, there was no evidence of significant multicollinearity, with $1/VIF$ values always higher than 0.16.

Endogeneity

The control variable *Caseload* is potentially endogenous. That is, in addition to effort depending on a hospital's caseload, caseload *may* be higher in hospitals where the amount of medical effort exerted is higher (as measured by Models *A*, *B* and *C*). This brings up fundamental causality concerns. To test whether caseload was significantly endogenous, an approach used in the health econometric literature was adopted (see, for example, Waters 1999). This approach is computationally equivalent to an omitted variable version of the Hausman test. It first involved running an auxiliary regression on caseload, but excluding effort (as measured by Models *A*, *B* and *C*) from its explanatory variables. The predicted values for caseload from this secondary regression were then used as an additional explanatory variable in the original medical effort regressions. If the coefficient of the predicted value term was significantly different from zero, it indicates that caseload is indeed endogenous.

As the predicted values for caseload were not statistically significant in any of the models, exogeneity of the variable caseload cannot be rejected, and thus endogeneity is unlikely to be a significant problem. Other variables, though, were excluded from the model because there were strong reasons to believe they were endogenous. This was the case for length of stay (an additional severity control variable). It was also the reason why a patients' daily charge for room and board (*Daily Charge RB*) was used, rather than total charge for room and board, and other health expenditures.

6.3 Results

6.3.1 Descriptive statistics

Facility surveys were conducted in 30 districts, with a total of 6098 patients interviewed. Amongst the 30 hospitals, 17 had internal monitoring mechanisms and 26 were externally monitored in one or both time periods. Nearly a third (30%) of patients had and used PHIC insurance. Tables 6.6a and 6.6b give some of the main hospital and patient characteristics respectively.

Table 6.6a Hospital characteristics

	Number of hospitals	%
Internal monitoring ^a	17	57
External monitoring ^a	26	87
	Mean	Median
# Key laboratory services ^b	3.3	3
# Stethoscopes	6.5	7
# Otoscopes	1.4	1
# Sterilizers	2.5	2
# Beds	63	55
Inpatient caseload (in last month)	361	349

^a In either or both time periods. ^b Refers to which of 5 lab services are performed in the hospital: fecalysis, CBC, gram stain, electrolytes and bacterial culture.

Table 6.6b Patient characteristics

	Number of patients	%
Pneumonia inpatients	1746	30% ^c
Diarrhoea inpatients	1539	29% ^c
PHIC insurance		
– Yes (and will claim)	1812	30%
– Yes (but will not claim)	190	3%
– Not PHIC member	4096	67%
Education of child's mother		
– None (0)	38	1%
– Less than primary (1)	779	13%
– Primary (2)	1214	20%
– Secondary (3)	2666	44%
– Tertiary+ (4)	1348	22%
	Mean	Median
Annual Household Income	65,177 PHP (\$1240 ^d)	43,500 PHP (\$828)
Daily Room and Board Charge	159 PHP (\$3.03)	125 PHP (\$2.38)

^c These percentages are by construct (see section 3.3.2 in chapter 3), rather than reflecting a hospital's inpatient mix.

^d Using the average Philippine Peso to US dollar exchange rate in the study period 2003-7.

6.3.2 Clinical packages

Dependent variables

Just over half of the sample received less than the standard inpatient package for both pneumonia (54.9%) and diarrhoea cases (59.6%). Of these, most received the ‘incomplete package’ (category 2), rather than nothing (category 0) or only diagnostics tests (category 1), as the figure below illustrates.

Figure 6.2: Clinical package received

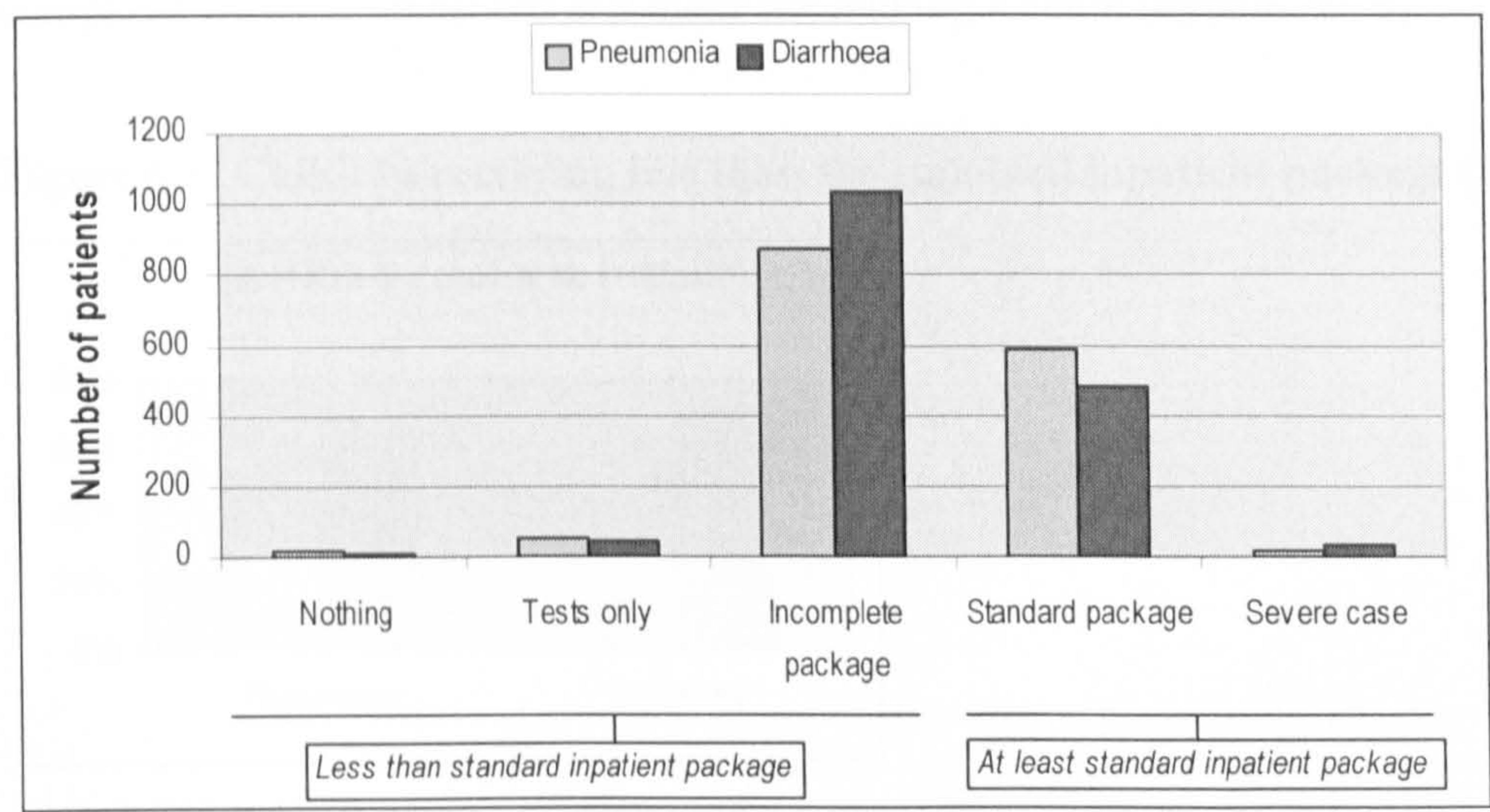


Figure 6.1 illustrates how the distribution is concentrated around package categories 2 & 3. It is also important to note that 11.9% of pneumonia patients and 11.7% of diarrhoea patients did not fit into any of these package categories. These were excluded from the analysis.

Cross-tabulations and bivariate analyses

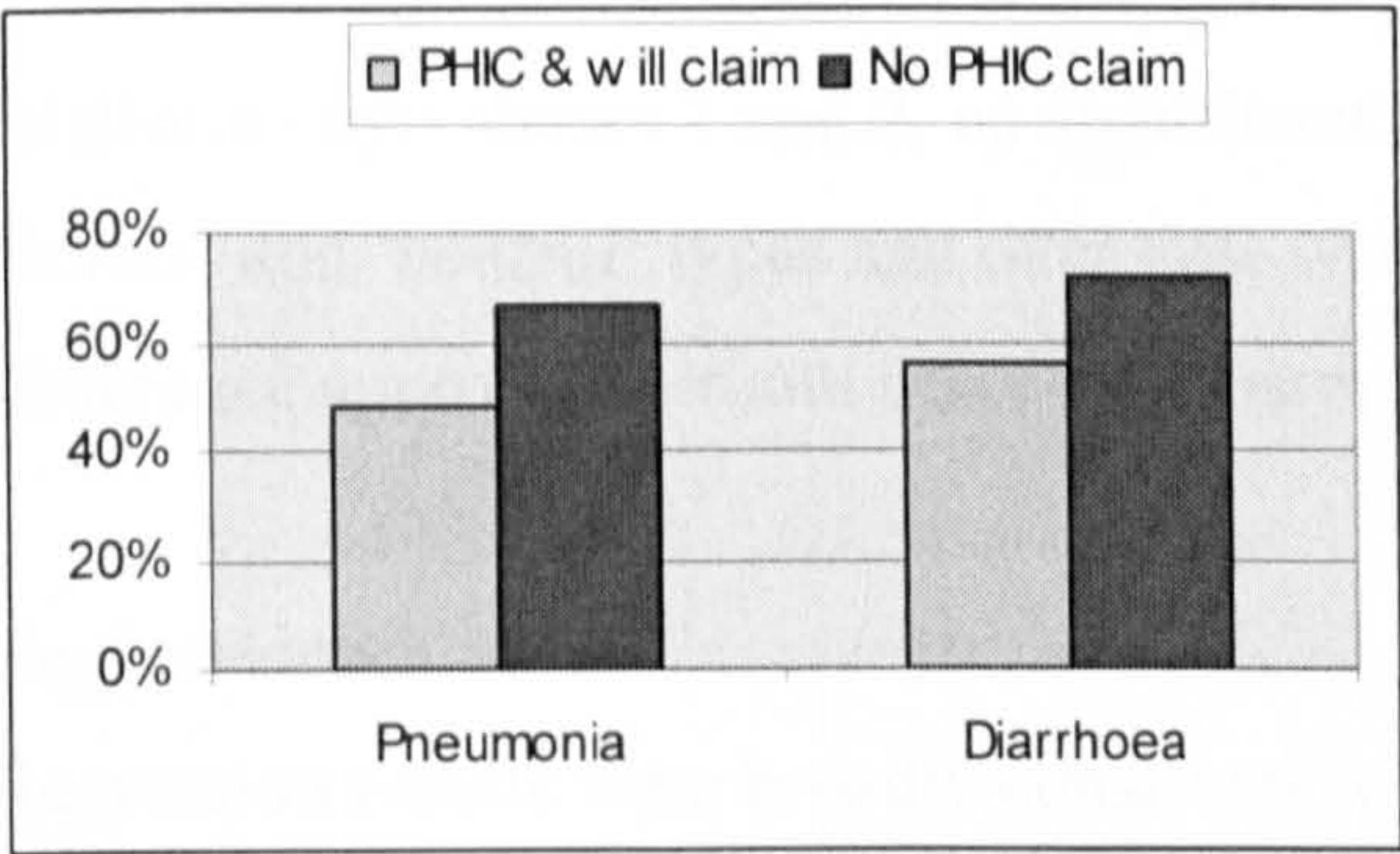
The daily charge for room and board is a statistically significant determinant of the volume of health service received, as measured by clinical packages (hypothesis 2). The average daily charge for patients receiving less than the standard inpatient package was 137PHP for pneumonia cases and 145PHP for diarrhoea cases, significantly lower than 185PHP and 182PHP for those receiving (at least) the standard inpatient package, for pneumonia and diarrhoea cases respectively.

Table 6.7: Impact of daily charge for room and board on clinical package received

Volume of health services received	Average daily charge for room and board	
	<i>Pneumonia</i>	<i>Diarrhoea</i>
Less than the standard inpatient package	137 PHP [n=941]	145 PHP [n=1088]
At least the standard inpatient package	185 PHP [n=598]	182 PHP [n=523]
Difference (associated <i>p</i> -value)	48PHP (<i>p</i> =0.0172)	37PHP (<i>p</i> =0.0919)

Further, comparisons of children by PHIC insurance status show that children with PHIC insurance are less likely to receive less than the standard inpatient package, as compared with the uninsured and those not making a claim (hypothesis 6):

Figure 6.3: Children receiving less than the standard inpatient package (%)



That is, for children with pneumonia, 48% of those with PHIC (and making a claim) received less than the standard inpatient package, as compared with 67% for the uninsured/insured but not making a claim (*p*-value=0.0199). The respective figures for children with diarrhoea were 56% and 72% (*p*-value=0.0433).

External monitoring also increased the likelihood of receiving (at least) the standard inpatient package (hypothesis 5), as shown in table 6.5. In contrast, internal monitoring had no statistically significant effect.

Table 6.8: Impact of external monitoring on the clinical package received

External Monitoring	Children receiving less than standard inpatient package (%)	
	<i>Pneumonia</i>	<i>Diarrhoea</i>
Yes	52%	60%
No	71%	75%
Difference (associated <i>p</i> -value)	-19% (<i>p</i> =0.0080)	-15% (<i>p</i> =0.0277)

Other variables measuring incentives (financial or social) were not statistically significant predictors of the clinical package received. For hypothesis 3, the proportion of children receiving less than the standard inpatient package was not statistically different between the poorest (first income quintile) and other households. The education of a child’s mother (hypothesis 4) did not significantly affect the likelihood of a child receiving less than the standard inpatient package. In relation to hypotheses 1 and 2, no significant differences across hospital ‘*access*’, ‘*bonus*’ and ‘*control*’ types and over time were found (using a difference-in-difference approach without other explanatory variables).

Regressions

Regression results were broadly consistent with the cross-tabulation analyses, as table 6.9 shows:

Table 6.9 Model A regression results

Variable	Pneumonia cases (n=1525)			Diarrhoea cases (n=1588)		
	O.R.	se	P> z	O.R.	se	P> z
Access	1.1298	0.747	0.8540	0.7497	0.450	0.6310
Bonus	1.0734	0.607	0.9000	1.1855	0.574	0.7250
Time	1.0516	0.640	0.9340	0.9364	0.684	0.9280
Bonus*Time	0.6153	0.503	0.5220	0.8518	0.791	0.8630
Access*Time	0.5634	0.672	0.6300	0.9772	1.129	0.9840
Daily Charge RB	1.0014	0.001	0.0880	1.0006	0.001	0.5650
HH Income Q2	0.8528	0.191	0.4760	1.0011	0.202	0.9960
HH Income Q3	1.0721	0.283	0.7920	0.9188	0.172	0.6510
HH Income Q4	1.3089	0.319	0.2690	0.9660	0.214	0.8760
HH Income Q5	1.1235	0.307	0.6700	0.8043	0.193	0.3640
Education	0.8802	0.069	0.1050	1.0886	0.074	0.2140
Internal Monitoring	0.9736	0.365	0.9430	0.3849	0.170	0.0300
External Monitoring	1.9125	0.596	0.0380	2.2597	0.812	0.0230
PHIC Insured + claim	2.0806	0.264	<0.0001	2.4573	0.607	<0.0001
# Symptoms				1.0757	0.038	0.0380
Treated before	1.7316	0.309	0.0020			
Lab services				2.0466	0.704	0.0370
Stethoscopes				0.8599	0.060	0.0300
Sterilizers	1.3759	0.160	0.0060	1.6518	0.197	<0.0001
# Beds				1.0133	0.008	0.0920
Caseload	1.0037	0.001	0.0020			

Notes: (1) other control variables were included, but only those that were statistically significant at the 90% level shown here (see table 6.3 for details); (2) ordered logit specifications produced similar and consistent results.

Children using PHIC insurance had 2.09 (pneumonia cases) or 2.46 (diarrhoea cases) times greater odds of receiving (at least) the standard inpatient package, as compared with children not having or utilising PHIC insurance. Physicians working in hospitals that were externally monitored had 1.91 (pneumonia cases) or 2.26 (diarrhoea cases) times greater odds of providing the standard inpatient package, as compared with physicians working in hospitals without external monitoring.

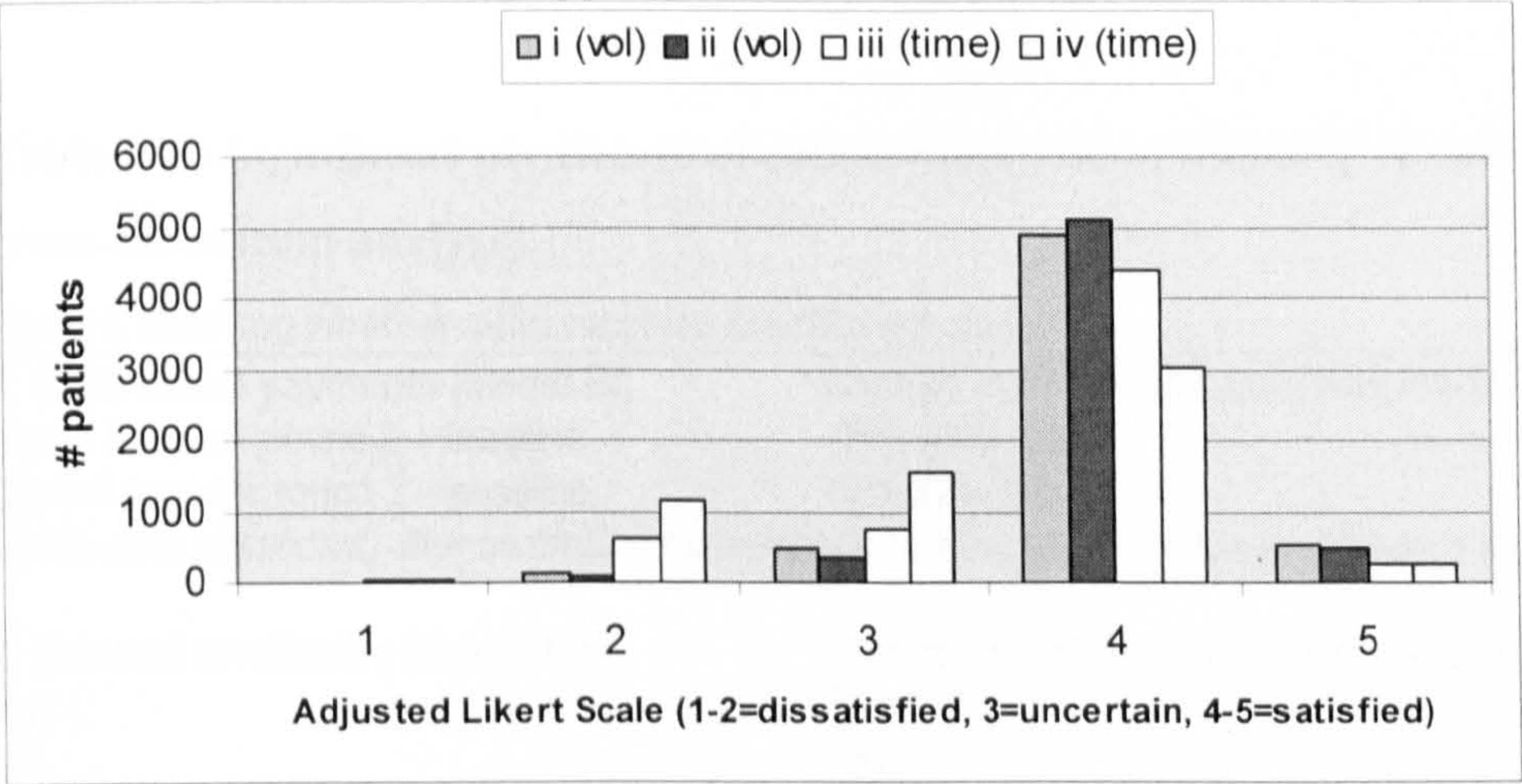
For pneumonia cases only, a 100PHP (\$1.91USD) increase in the daily room and board charge increased the odds of receiving a standard inpatient package by 14% (i.e. 0.0014*100, since the odds ratio for this variable is based on a single peso increase). For diarrhoea cases only, internal monitoring was also statistically significant, although contrary to expectations its odds ratio was less than one.

6.3.3 Perception variables

Dependent variables

For all four dependent variable specifications, a majority of respondents reported being satisfied, with a concentration of responses around the dependent variable value 4 – equivalent to moderate satisfaction:

Figure 6.4 Patient perceptions on the sufficiency of volume of services (i & ii) & time devoted (iii & iv) to the sick child



Using an ordered logit specification produced regressions with very limited explanatory power (with pseudo-R2 values of only 0.03-0.05), as well as specification errors (see section 6.2.6). Thus each dependent variable was reduced to a logit specification. Values 1-3 were recoded as zero, representing the patient’s mother (or other carer) not being satisfied (i.e. dissatisfied or uncertain); values 4-5 were recoded as one, representing a satisfied response.

Cross-tabulations / bivariate analyses

In model (i), patients receiving care from physicians working in ‘bonus’ hospitals were 5.33 times greater odds of being satisfied with sufficiency of service volume than those working in ‘control’ hospitals, after controlling for trend effects (*Bonus*Time*), but without other explanatory variables (hypothesis 1). There were,

though, no significant differences between ‘*bonus*’ and ‘*control*’ hospitals in models ii-iv. Nor were there between ‘*access*’ and ‘*control*’ hospitals in all four model variants (hypothesis 2).

In model (iv), the daily charge for room and board, and whether a physician worked in an externally monitored hospital, were statistically significant determinants of sufficiency of time spent with the child. Other cross-tabulations between the various dependent variable specifications and explanatory variables did not produce statistically significant results.

Table 6.10 Significant predictors of satisfaction with sufficiency of care, from cross-tabulation analyses

Factors affecting whether child received insufficient care	
1. QIDS bonus payments (Model <i>Bi</i>)	Change in % children receiving insufficient care
Bonus hospital: round 2 – baseline	-17% (8%-25%)
Control hospital: round 2 – baseline	+2% (8%-6%)
<i>- Difference significant, after controlling for trend effects through difference-in-difference methodology</i>	
2. External monitoring (Model <i>Biv</i>)	Children receiving insufficient care (%)
Yes	39%
No	53%
Difference (associated <i>p</i> -value)	-14% (<i>p</i> =0.0440)
3. Daily charge for room and board (Model <i>Biv</i>)	Average daily charge
Insufficient care	139PHP
Sufficient care	176PHP
Difference (associated <i>p</i> -value)	37PHP (<i>p</i> =0.0556)

Regressions

Some of the variables reflecting financial incentives were statistically significant, although never consistently across all four model variants, as shown in tables 6.11a and 6.11b below.

Table 6.11a: Model B regression results – sufficiency of volume of services

Model Bi (n=5994) Wald chi2=155 (Prob>chi2 <0.001) Log pseudolikelihood = -1802.9 Pseudo R2 = 0.0985; AIC*n=3652				Model Bii (n=6001) Wald chi2 =1218 (Prob>chi2 <0.001) Log pseudolikelihood = -1563.4 Pseudo R2 = 0.0414; AIC*n=3165		
Variable	O.R.	se	P> z	O.R.	se	P> z
Access	0.8368	0.244	0.5410	0.8756	0.431	0.7870
Bonus	0.1469	0.066	<0.0001	0.9765	0.453	0.9590
Time	1.1274	0.535	0.8010	1.3188	0.550	0.5070
Bonus*Time	4.5225	3.507	0.0520	0.9655	0.614	0.9560
Access*Time	1.2463	0.969	0.7770	2.4929	1.931	0.2380
Daily Charge RB	0.9997	0.001	0.6810	1.0015	0.001	0.0370
HH Income Q2	0.9605	0.183	0.8330	1.0263	0.187	0.8860
HH Income Q3	1.3549	0.284	0.1470	1.2780	0.248	0.2070
HH Income Q4	1.1870	0.258	0.4310	1.2004	0.273	0.4220
HH Income Q5	1.0676	0.256	0.7850	0.9713	0.196	0.8850
Education	0.9012	0.056	0.0930	0.9573	0.056	0.4510
Internal Monitoring	0.9578	0.261	0.8740	1.0887	0.304	0.7600
External Monitoring	0.9906	0.261	0.8740	0.7587	0.258	0.4170
PHIC insured + claim	1.0426	0.128	0.7340	0.8360	0.141	0.2880
Otosopes				1.5909	0.216	0.0010
Caseload				0.9986	0.001	0.0290
Diarrhoea cases	0.7178	0.081	0.0030			

Note: other control variables were included, but only statistically significant (90%) shown here.

Table 6.11b: Model B regression results – sufficiency of time spent with child

Model Biii (n=5991) Wald chi2=1254 (Prob>chi2 <0.001) Log pseudolikelihood = -3020.9 Pseudo R2 = 0.0762; AIC*n=6096				Model Biv (n=5996) Wald chi2 =155 (Prob>chi2 <0.001) Log pseudolikelihood = -3722.6 Pseudo R2 = 0.0995; AIC*n=7497		
Variable	O.R.	se	P> z	O.R.	se	P> z
Access	1.3918	0.757	0.5430	1.0495	0.617	0.9340
Bonus	1.2550	0.642	0.6570	1.2139	0.638	0.7120
Time	1.8035	0.796	0.1810	1.9041	1.053	0.2440
Bonus*Time	0.7932	0.701	0.7930	0.3724	0.305	0.2270
Access*Time	1.3506	1.214	0.7380	1.0010	0.688	0.9990
Daily Charge RB	1.0010	0.001	0.2460	1.0009	0.001	0.2140
HH Income Q2	0.9581	0.123	0.7400	0.9362	0.106	0.5600
HH Income Q3	1.1859	0.173	0.2420	0.9958	0.137	0.9760
HH Income Q4	1.0487	0.162	0.7580	0.8081	0.143	0.2300
HH Income Q5	0.8711	0.156	0.4410	0.8092	0.121	0.1570
Education	0.9520	0.048	0.3260	0.9853	0.054	0.7850
Internal Monitoring	1.1686	0.462	0.6940	0.7686	0.294	0.4910
External Monitoring	0.8124	0.291	0.5620	1.5968	0.541	0.1670
PHIC insured + claim	0.7417	0.119	0.0630	0.8834	0.104	0.2930
Otosopes	1.7220	0.462	0.6940	1.7946	0.380	0.0060
Diarrhoea cases	0.7723	0.100	0.0450			

Note: other control variables were included, but only statistically significant (90%) shown here.

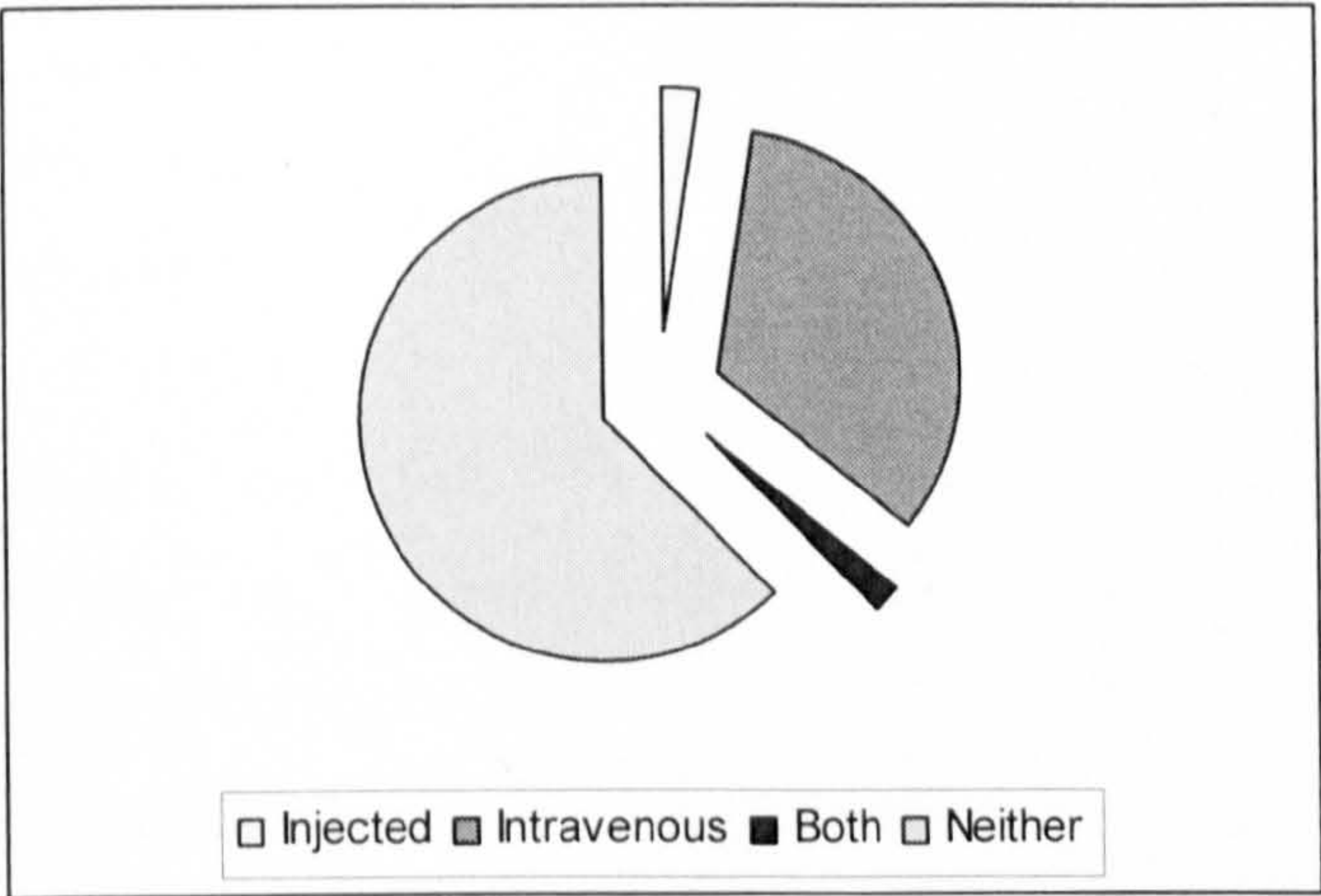
Model *Bi* showed that patients receiving care from physicians working in ‘*bonus*’ hospitals had 4.52 times greater odds of being satisfied with sufficiency of service volume than those working in ‘*control*’ hospitals, after controlling for trend effects (*bonus*time*). This model also found that a one unit increase in a child’s mother’s education level *decreased* the odds of being satisfied with sufficiency of service volume by 10%, in contrast to hypothesis 5. In Model *Bii*, a 100PHP increase in the daily room charge increased the odds of a respondent being satisfied with the sufficiency of service volume by 14%. In Model *Biii*, those with (and using) PHIC insurance had 26% *lower* odds of being satisfied with the sufficiency of care.

6.3.4 Medication administration type

Dependent variable

Of the full sample, 33.3% of children received medication intravenously as compared with 2.5% by injection. Note also that 1.9% received both forms, and 62.3% received medications orally or did not receive any medication:

Figure 6.5 Medication administration type (full sample)



These proportions were similar for the sub-samples of pneumonia and diarrhoea cases.

Cross-tabulations

Patients receiving care from physicians working in '*bonus*' hospitals were less likely to receive medication by injection rather than intravenously, for both pneumonia (82%) and diarrhoea (84%) cases than those working in '*control*' hospitals, after controlling for trend effects (*Bonus*Time*) but without other explanatory variables (hypothesis 1). However, all other cross-tabulations between the dependent variable and explanatory variables did not produce statistically significant results, for both pneumonia and diarrhoea cases.

Regressions

In contrast to cross-tabulations results, multivariate regression analyses found that a number of both hospital- and patient-level explanatory variables were statistically significant, particularly for the pneumonia sub-sample (see table 6.12). This can be explained by the presence of better controls for confounding in multivariate regressions; and, for the pneumonia sub-sample, by adjusting for the presence of heteroscedasticity.

Table 6.12: Model C regression results

Variable	Pneumonia cases (n=758)				Diarrhoea cases (n=521)		
	Wald chi2 =1735 (Prob>chi2 <0.001) Log pseudolikelihood = -132.5 Heteroscedastic-adjusted model*				Wald chi2 =127 (Prob>chi2 <0.001) Log pseudolikelihood = -135.7 Pseudo R2 = 0.1404; AIC*n=313		
	Coeff.	O.R.*	se	P> z	O.R.	se	P> z
Access	-0.027	0.9550	0.159	0.8650	1.4188	1.272	0.6960
Bonus	0.195	1.3931	0.138	0.1590	0.7743	0.453	0.6620
Time	0.097	1.1786	0.113	0.3930	6.6322	5.922	0.0340
Bonus*Time	-0.492	0.4336	0.209	0.0190	0.0765	0.098	0.0450
Access*Time	0.067	1.1206	0.156	0.6670	0.1229	0.146	0.0770
Daily Charge RB	-0.001	0.9986	<0.001	0.0200	1.0003	0.001	0.8450
HH Income Q2	-0.180	0.7365	0.105	0.0850	0.9080	0.478	0.8550
HH Income Q3	-0.255	0.6487	0.096	0.0080	1.2373	0.778	0.7350
HH Income Q4	-0.116	0.8210	0.070	0.0960	0.9177	0.609	0.8970
HH Income Q5	-0.141	0.7870	0.086	0.1030	0.3034	0.281	0.1990
Education	0.168	1.3310	0.025	<0.0001	0.9488	0.112	0.6560
Internal Monitoring	0.109	1.2044	0.086	0.2050	0.8628	0.436	0.7700
External Monitoring	-0.204	0.7067	0.101	0.0430	0.3871	0.226	0.1040
PHIC Insured + claim	0.198	1.3994	0.078	0.0110	0.9882	0.403	0.9770
# Symptoms	-0.035	0.9430	0.017	0.0460	0.8710	0.054	0.0260
Caseload					2.9581	1.085	0.0030

Note: other control variables were included, but only statistically significant (95%) shown here. See table 6.3 for details.

Note: regressions with patients receiving medication intravenously and by injection gave broadly consistent results.

* For the pneumonia sub-sample, a probit model adjusted for heteroscedasticity in the Education variable was used. This reports a probit coefficient, and a "logit-equivalent" odds ratio (this is reached by multiplying the probit coefficient by 1.7, to give an approximately equivalent logit coefficient, then taking the exponential of this to acquire the logit-equivalent odds ratio).

For both pneumonia and diarrhoea cases, physicians working in ‘*bonus*’ hospitals were less likely to administer medication by injection rather than intravenously, as compared with those working in ‘*control*’ hospitals and after controlling for trend effects (hypothesis 1). In particular, such physicians were 50.8% and 92.3% less likely to administer medication by injection rather than intravenously (*Bonus*Time*). For diarrhoea cases only, the same was true for ‘*access*’ hospitals (*Access*Time*), with physicians working in such hospitals 87.7% less likely to administer medication by injection than intravenously.

For pneumonia cases only, patients paying higher daily room charges were less likely to receive medications by injection (hypothesis 2). In particular, a 100PHP increase in charges decreased the odds of receiving medication by injection rather than intravenously by 14%. Further, patients with (and using) PHIC insurance had

39.9% *greater* odds of receiving medications by injections than patients not using PHIC insurance or being uninsured (hypothesis 6).

Patients in the bottom income quintile were the most likely to receive medications by injection, as shown by the odds ratios for the household income quintile variables (hypothesis 3). A mother's education was also statistically significant, although its odds ratio was greater than one, contrary to expectations (hypothesis 4). Physicians working in externally monitored hospitals had 29.3% lower odds of administering medications by injection rather than intravenously, as compared with physicians working in hospitals without external monitoring (hypothesis 5).

6.4 Discussion

6.4.1 Evaluation of testable hypotheses

Hypothesis 1: Performance-based payments encourage a more appropriate effort level if they are well correlated with e^* .

Empirical proxy: Physicians working in QIDS 'bonus' hospitals (receiving bonus payments for meeting quality standards) are less likely to provide insufficient and inappropriate care.

Bonus payments based on quality of care were effective in improving the appropriateness of the type of health services provided. Physicians working in 'bonus' hospitals were 51% less likely to administer medication by injection than intravenously for pneumonia cases, and 92% less likely for diarrhoea cases (Model C). There was also some limited evidence that bonus payments reduced the probability of providing insufficient care (Model *Bi*, but not in Models *Bii-iv* or Model *A*). A child's carer had 4.52 times greater odds of agreeing with the statement: "I think my doctor has done everything needed to provide complete medical care" if treated by physicians working in 'bonus' hospitals, as compared with 'control' hospitals.

Hypothesis 2: More effort will be exerted on patients that a doctor receives a higher financial reward from.

Empirical proxy: Patients paying a higher daily rate for room and board are less likely to receive insufficient and inappropriate care.

There was some evidence that paying more for room and board improved the sufficiency of care received. In Model *A*, for pneumonia (but not diarrhoea) cases, a 100PHP increase in the daily room charge increased the odds of receiving (at least) the standard inpatient package by 14%. In Model *Bii* (but not Models *Bi*, *iii* or *iv*), children paying 100PHP more for daily room and board had 15% time greater odds of being satisfied with the sufficiency of care. For pneumonia (but not diarrhoea) cases, paying more for room and board also improved the type of care received (Model C). A 100PHP increase in charges decreased the odds of receiving medication by injection than intravenously by 14%.

Empirical proxy: Physicians working in QIDS 'access' hospitals (where there is increased depth and breadth of insurance coverage in the district) are less likely to provide insufficient and inappropriate care.

No evidence could be found to support this hypothesis (in Model *A* or *B*).

Hypothesis 3: More effort will be exerted on patients from whom a doctor receives a higher non-financial reward.

Empirical proxy: Patients coming from wealthier households are less likely to receive insufficient and inappropriate care.

Although a child's household income did not have any significant effect on the sufficiency of care received (Models *A* and *B*), there was some evidence that it did impact on the type of healthcare given (Model *C*). That is, for pneumonia cases, children from the bottom income quintile had 28-35% times greater odds of receiving medication by injection rather than intravenously, as compared with children from the other four income quintiles. No significant results, though, were found for diarrhoea cases.

Hypothesis 4: More effort will be exerted on patients who are better able to advocate for more care.

Empirical proxy: Patients whose mothers have attained higher education levels are less likely to receive insufficient and inappropriate care.

No evidence could be found to support this hypothesis (in Models *A*, *B* or *C*).

Indeed, Model *Bi* found that higher education levels increased the likelihood of being dissatisfied with the sufficiency of care. Since Model *B* is based on a child's carer's *perceptions* of sufficiency, this result may be due to differences in expectations rather than actual differences in sufficiency of care received, with more educated mothers having higher expectations. Higher education also increased the likelihood of receiving medication by injection rather than intravenously, for pneumonia cases (Model *C*), potentially because more educated mothers actually preferred their children to receive medications by injection.

Hypothesis 5: Doctors that are effectively monitored will provide a more appropriate effort level.

Empirical proxy: Physicians working in hospitals that are externally monitored through Sentrong Sigla accreditation are less likely to provide insufficient and inappropriate care.

External monitoring improved the sufficiency and type of care received. In Model *A*, physicians working in externally monitored hospitals had 1.9 (pneumonia cases) and 2.3 (diarrhoea cases) times higher odds of providing (at least) the standard inpatient package, as compared with other physicians. Physicians in externally monitored hospitals were also 29% less likely to administer medications by injection rather than intravenously for pneumonia cases, as compared with other physicians.

Empirical proxy: Physicians working in hospitals that have internal quality control committees are less likely to provide insufficient and inappropriate care.

In contrast, internal monitoring did not improve the sufficiency or type of care a patient received. Indeed, for diarrhoea cases, Model *A* suggested it may even have reduced the sufficiency of care received.

Hypothesis 6: More effort will be exerted on the insured than the non-insured (independent of the reward a doctor receives from a patient).

Empirical proxy: Patients who have (and use) PHIC insurance are less likely to receive insufficient care, but more likely to receive inappropriate care.

Having PHIC insurance reduced the probability of receiving insufficient care, as measured by the package of care a child received (Model *A*). Children who have and use PHIC insurance had 2.1 (pneumonia cases) to 2.5 (diarrhoea cases) times higher odds of receiving (at least) sufficient care, as compared with children not having or utilising PHIC insurance. Model *Biii*, though, gave contrasting results: children using PHIC insurance were 26% *less* likely to be satisfied with the sufficiency of care received (this variable was insignificant in other Model *B* variants). As with hypothesis 4, this result may be explained by PHIC members having higher expectations than non-PHIC members, rather than actual differences in sufficiency of care received.

There was also some evidence that children using PHIC insurance were more likely to receive medication by injection (Model C). For pneumonia cases, children using PHIC insurance were 39.9% more likely to receive medications by injections than children not using PHIC insurance or being uninsured. For diarrhoea cases, though, results were insignificant.

6.4.2 Limitations of analysis

Each of Models A, B and C has its limitations. These can be separated into those that are essentially statistical and those that are more substantive. Substantive limitations relate to the assumptions inherent in empirical specifications, particularly the choices of dependent variables and some of the measures of incentives.

Statistical limitations

In all models, dependent variable specifications are based on recall of services received. If a patient's carer is more likely to forget care received than to over-report care they have not received, this introduces a systematic bias. Further, although proxies for severity of illness are included, and separate regressions are run for pneumonia and diarrhoea inpatient cases, these are still likely to be imperfect controls for severity. Statistical power is potentially limited by physician-level data being averaged at the hospital level. This weakens the strength of coefficients if doctors within a hospital face different incentives from one another. Data clustering also reduces the statistical power of regressions.

In regressions based on patient satisfaction (Model B), respondents may have been reluctant to voice dissatisfaction, since they were interviewed within the hospital grounds. Still, respondents knew that the survey was confidential. The reluctance to voice dissatisfaction may well have explained the lack of variation in the dependent model (even after collapsing it from an ordered logit to logit specification), and consequent limited explanatory power of all Model B variants.

Substantive limitations

More substantive limitations relate to there not being empirical proxies available for certain aspects of the incentive structure. As with the statistical limitations, the effect of most of these is to reduce the explanatory power of regressions.

A first substantive limitation is that the incentive to provide more care to patients from whom the financial reward is higher is a hospital-level incentive. That is, it is the hospital as a whole that benefits financially from the patient. This financial incentive may only partially permeate down to the doctor, but there are no data to indicate how much this occurs.

Secondly, LGUs have official discretion over the extent to which public district hospitals can retain revenues generated from health insurance or user charges. Thus hospitals retaining a smaller proportion of these revenues will face a weaker financial incentive to differentiate between patients for financial reasons. Unfortunately, the dataset does not include data on this revenue retention.

In this chapter, it is also assumed that all doctors react in the same way to financial and non-financial incentives. Differences in how strongly doctors react to these incentives (for instance because of differences in the value attached to altruistic motivations) may well be important in explaining why there is not a systematic response by doctors to the incentives analysed in this paper, but there is no data available to test if this is the case.

There are other substantive limitations specific to each of the three models. For clinical packages analysis (Model A), the analysis is predominantly limited to analysing the quantity rather than the quality (in terms of sufficiency) of care. As discussed in section 6.2.2, receiving less than the standard inpatient package can only be interpreted as insufficient if the doctor has correctly diagnosed the patient. Other data suggest, however, that diagnoses and treatment in the Philippines, like

other developed and developing countries, is done correctly only 50-55% of the time for patients with diarrhoea and pneumonia (Peabody and Liu 2007).

For regressions based on patient satisfaction (Model *B*), their accuracy as a measure of the sufficiency of care is limited by any systematic variation in *expectations* of sufficiency (which may explain, for example, differences between PHIC insured and the non-insured). Indeed, a broad literature has pointed out to various biases in likert scales, including cultural, gender and literacy biases (see, for example, Noyes 1998).

For analysis of the type of medical administration (Model *C*), administering medication by injection rather than intravenously is assumed to always be preferable for the patient, once disease severity has been controlled for. Consequently when physicians do not choose intravenous administration, this reflects less effort. However, there may still be patients for whom injected medication was not feasible. Further, recall problems may mean respondents incorrectly answer how their child received medications. Both of these concerns are addressed in part by excluding patients who received medication both intravenously and by injection. Perhaps more importantly, evidence elsewhere shows that patients (or their carers) may actually prefer to receive an injection even when there is no clinical reason for this (see, for instance, Paredes *et al.* 1996). That is, it may reflect a demand-side as well as a supply-side incentive.

6.4.3 Summary and conclusion

This chapter found that the medical effort a public physician exerts in treating a patient, as measures by the volume and type of health services provided, is influenced by the incentive structure. In particular, patients paying more for room and board, and patients treated in externally monitored hospitals were less likely to receive insufficient and inappropriate care. Further, bonus payments based on quality of care were effective in improving the appropriateness of care (though rarely in reducing the likelihood of insufficient care). Physicians also responded to the financial incentives inherent in patients with (and using) PHIC insurance. Such

patients were less likely to receive insufficient care. At the same time, patients with and using PHIC insurance were more likely to receive inappropriate care – that is, medication by injection rather than intravenously. This could be explained by reimbursement from PHIC being the same either way, and administering medication by injection is quicker (requires less effort) than intravenous administration.

However, results indicated that these responses to supply-side incentives by physicians were never pervasive across all model variants. This may be explained by limitations of the analysis, particularly the likely low intensity of financial incentives faced by individual public doctors in the Philippines. Nevertheless, a physician's behaviour is not immune to the incentive structure s/he operates within, and consequently public hospital patients with equal health need are not always treated equally.

Chapter 7: An unhealthy public-private tension: pharmacy ownership, prescribing and spending

7.1 Introduction

Public sector doctors in LIC and LMIC settings are often poorly paid (Van Lerberghe *et al.* 2002). This is apparent in the Philippines, where salaries of public hospital physicians are low when compared with what they could earn in alternative employment (see chapter 4 for further details). Consequently, many doctors in such settings undertake additional work or invest in the private sector; some even leave the public sector altogether. Whilst the need to undertake extra work in these circumstances is understandable, it is a concern to policymakers if it adversely affects the healthcare a patient receives.

When additional work is not related to healthcare, its only potentially negative effect on healthcare is if it results in physicians shirking from their regular duties. Whilst this can in extreme cases be serious, the adverse effect to patients is limited to reducing a doctor's medical effort. For example, physicians may rush through patient consultations, or reduce the number of hours spent in the public health facility, but otherwise there is no incentive for physicians not to give the best possible healthcare to their patients.

However, if the doctor's additional work is healthcare related, more perverse financial incentives can emerge. This occurs since the healthcare given to a patient in a public facility can directly alter the doctor's income from their additional work outside this health facility. In particular, the conceptual framework in chapter 3 showed how a doctor's referral behaviour can be affected when s/he owns or has financial links with ancillary health facilities, and how consequently patients can spend more on healthcare than is needed.

In this chapter, these insights are tested through analysis of physician ownership of private pharmacies in the Philippines. Coupled with low salaries for Philippine public sector physicians, is limited availability of medicines in public hospitals, particularly for hospitals located outside of the country's major cities. For example, in 98.7% of inpatient cases for children aged under-six in 30 public hospitals in the Visayas, the parent/carer had to obtain additional prescribed medicines outside of the hospital (source: QIDS dataset, 2002). Moreover, the amount spent outside the hospital by these patients was not insignificant – on average, it amounted to 751PHP (\$19), or 62% of what they spent inside the hospital (1211PHP or \$31).

Analysis in this chapter is based on interviews of pharmacy customers from 7 districts in the Philippines (see chapter 3 for details of this primary data collection). Customers were asked whether they had a prescription, if so, from whom, and how much they spent. Data on the price and availability of selected essential medicines were also collected from private pharmacies and public hospital pharmacies. Accordingly, the research analysed whether pharmacy-owning physicians are able to influence a patient's medical purchasing behaviour, both in terms of the pharmacy patients choose to use, and their health expenditure.

7.2 Methods

7.2.1 Links with hypotheses from conceptual framework

A patient’s drug purchasing decision should depend primarily on the price and quality of medicines in different pharmacies, and on the convenience of a pharmacy’s location for the patient. But the conceptual framework developed in chapter 3 showed that doctors can influence a patient’s purchasing decision in pharmacies and other ancillary health facilities, and why they might have the incentive to do so. It then showed how these supply-side incentives can result in patients spending more on medicines than is needed. Two related hypotheses derived from the conceptual framework are tested in this chapter. These hypotheses, along with their corresponding empirical proxies, are given in table 7.1 below.

Table 7.1: Testable hypotheses

Hypothesis	Empirical proxies
7. Doctors owning (or having financial links with) external ancillary health facilities will refer patients to such facilities.	– Physicians owning, or with direct familial links to, a private pharmacy will encourage patients to purchase medicines from their pharmacy.
8. Patients referred to doctor-owned ancillary facilities will spend more on healthcare they need to.	– Patients with prescriptions from pharmacy-owning physicians will spend more in pharmacies than patients with prescriptions from other physicians. – Patients with prescriptions from pharmacy-owning physicians would spend less on medicines if generic versions were fully available within their local public hospital.

7.2.2 Model specification

A. Can physicians influence a patient’s drug purchasing behaviour (hypothesis 7)?

The approach is to model the probability that a patient (the pharmacy customer or the person for whom the customer was buying the medicines for) received a prescription from a public hospital physician. This uses a logit regression model:

$$\ln\left(\frac{P_i}{1-P_i}\right) = \alpha + \beta X_i + \phi W_i + \eta V_i + \mu_{i,l} \quad [A1]$$

where P_i denotes the probability of patient i receiving a prescription from a public hospital physician; X is a vector of patient-related characteristics; W is a dummy variable reflecting pharmacy ownership; V is a vector of other pharmacy-related characteristics; and $\mu_{i,l}$ is a vector of patient-level and pharmacy-level residuals.

Alternative dependent variable specifications are also explored, modelling the probability of receiving prescriptions from: a pharmacy-owning public hospital physician ($A2$), and a pharmacy-owning private physician ($A3$). Model $A1$ was estimated for the full sample; $A2$ only used data from the 5 districts in which a specific public physician owned a pharmacy; and $A3$ only used data from the 2 districts in which a private physician owned a pharmacy. In all model variants, a logit specification was chosen because of the binary nature of the dependent variable. Reasons given to why a customer chose to use a physician-owned pharmacy were also analysed.

B. Consequently, are patients spending more on prescribed medicine than they need to (hypothesis 8)?

B1: Analysis of pharmacy expenditures

In a first stage, health expenditure in pharmacies was modelled, using a logarithmic ordinary least squares (OLS) specification:

$$\ln(HE_i) = \alpha + \beta X_i + \phi W_i + \eta V_i + \mu_{i,l} \quad [B1]$$

where HE_i denotes the health expenditure of patient i ; X is a vector of patient-related characteristics, W is a vector of dummy variables combining pharmacy ownership with prescription-related patient characteristics, V is a vector of other pharmacy-related characteristics; and $\mu_{i,l}$ is a vector of residuals. This was estimated for both the full sample, with auxiliary regressions for the sub-sample of pharmacy customers

with prescriptions from a public hospital. The data collected did not distinguish between patients with prescriptions for inpatient treatment or outpatient use.

The logarithmic model specification was chosen as it transformed health expenditure into a normally distributed variable. Other transformations were considered based on a subset of the ladder of powers (Tukey 1977), but no others gave a successful normalisation of health expenditure. Box-Cox transformations supported this, giving a transformed dependent variable that was not significantly different from a log transformation, whilst rejecting linear and reciprocal transformations.

B2: Comparison of pharmacy expenditures with simulated generic expenditures

In a second stage, the sub-sample of individuals with a prescription from a pharmacy-owning public hospital physician was further analysed. These individuals' observed health expenditures in pharmacies were compared with what they could have spent on the same medicines if generic versions were fully available within public hospitals. This uses a standard *t* test approach:

$$\frac{\overline{HE}_1 - \overline{HE}_2}{S_{HE_1 - HE_2}} \quad [B2]$$

where \overline{HE}_1 refers to average observed health expenditure in pharmacies, and \overline{HE}_2 the average simulated health expenditure on medicines in public hospitals. That is,

$$HE_1 = \sum (P_{obs} * Q_{obs})meds$$

$$HE_2 = \sum (P_{alt} * Q_{obs})meds$$

where P_{obs} denotes the observed prices paid by individuals for selected essential medicines (*meds*), and P_{alt} reflects alternative prices based on reported generic prices for the medicines in the sample frame. For P_{alt} , the lowest, mean, median and

highest reported prices are all compared with P_{obs} . Table 7.3 in the next section provides details on the medicines used in this analysis.

Note that quantities of medicines purchased in a hospital are assumed to be the same as observed quantities purchased in pharmacies. That is, it is assumed that a physician's prescription practice would remain unchanged, implying no demand inducement (or, equivalently, the same level of inducement for patients purchasing medicines inside or outside the hospital).

For all econometric model specifications (i.e. Models *A1*, *A2*, *A3* and *B1*), the approach was to first estimate a full model, including a full variable set. Then a restricted model was estimated, excluding statistically insignificant control variables on the basis of the Akaike Information Criterion (AIC). In the results section, only the restricted model is presented¹⁹, with odds ratios rather than coefficients reported. This is the same econometric approach as that used in chapter 6.

7.2.3 Explanatory variables

Regression model variables testing research hypotheses

For Model *A*, the main variables of interest relate to pharmacy ownership (variables *Link Public Dr*, *Link Pvt Dr*, *Indpt*). In the case of model specifications *A1* and *A2*, pharmacies linked with a public hospital physician (*Link Public Dr* = 1) are compared with all other pharmacies. For model specification *A3*, pharmacies linked with a private clinic physician (*Link Pvt Dr* = 1) are compared with all pharmacies. The coefficients of *Link Public Dr* and *Link Pvt Dr* test hypothesis 7.

For Model *B1*, pharmacy customers with a prescription from a pharmacy-owning public physician (*Pres.type 1*) are expected to spend more than those with a prescription from other public physicians (*Pres.type 2*), testing hypothesis 8. Patients with a prescription from a public physician (*Pres.type 1* or *Pres.type 2*) are expected

¹⁹ Full model estimates were consistent to restricted model estimates in the sense that there were no drastic changes in the odds ratios and standard errors of explanatory variables.

to spend more than those with a prescription from other physicians (*Pres.type 3*), who in turn should spend more than those making over-the-counter purchases (*OTC*), for severity of illness reasons. Note that the term ‘patient’ refers to the person for whom the medicine/s was bought, whether or not this is the pharmacy customer. Each of these ‘prescription’ variables is combined with the public pharmacy ownership variable (*Link Public Dr*). This is done to give a more precise idea of under what circumstances those with a prescription from a pharmacy-owning public physician spend more than others, and to test if those using public physician-owned pharmacies also spend more. Additional regressions separate these dummies for simpler (but less precise) interpretation.

Regression model control variables

Various control factors at both pharmacy and pharmacy customer levels are also included. Pharmacy-related characteristics include a pharmacy’s proximity to the town’s public hospital (*Location*). The variable *Location* has an expected positive coefficient in Model *A* (specifications *A1* and *A2*), since it is likely to be more convenient for patients coming from a hospital to use the pharmacies that are closest to the hospital. The coefficient for Model *B1* is unclear a priori.

Other pharmacy-related variables reflect within which district the pharmacy was located (one of *Abuyog*, *Bais*, *Bayawan*, *Guilhulgnan*, *Oras*, *Palompon* or *Taft*). Districts which were QIDS ‘Access’ sites (*Bais*, *Palompon* and *Taft*) were expected to have negative coefficients in Models *A* and *B1* because the public hospitals in such districts should have better availability of medicines than other districts, as a result of the QIDS intervention. Note that the coefficient for districts which were QIDS ‘Bonus’ sites is unclear a priori (see section 3.3.2 in chapter 3 for further details on the QIDS policy interventions).

Pharmacy customer characteristics act as controls for conventional demand factors. Variables that are proxies for case-mix (*CM1* - *CM14*) were included to control for a patient’s severity of illness. These had expected positive coefficients as compared

with the reference case-mix of a customer having (that is, thinking s/he has) a cough or cold. The illnesses covered are: pneumonia, diarrhoea, high fever, problems related to delivery, other infection, accident/injury, vomiting, convulsions, abdominal pain, difficulty breathing, skin problem, tuberculosis, and other (specified by patient).

Socioeconomic status is measured by an asset index measuring whether a household has one or more of 8 assets (*HH Assets*). The assets referred to ownership of a: radio, television, sala (living room) set, refrigerator, washing machine, air conditioning, cell phone and car. These are a subset of the asset list used in the QIDS study. The single asset index was derived using principal components analysis. The variable *HH Income*, measuring a household's reported annual income, provides an alternative measure of socioeconomic status. However, as it is measuring the same customer characteristic, only one of *HH Assets* or *HH Income* was included in regression models. In both specifications, the expected coefficient is unknown a priori in Model *A*, since poorer individuals with a prescription from hospital may be less likely to purchase prescribed medicines in a private pharmacy (a negative effect), but may also be more likely to utilise public hospitals than richer individuals (a positive effect). In Model *B1*, the expected coefficient is positive, since richer individuals have a higher ability to pay for medicines.

A variable reflecting whether patients have PHIC insurance and plan to claim reimbursement (*PHIC insured + claim*) is also included. It has an expected positive coefficient in Model *A* because patients with prescriptions from a hospital are more likely to use private pharmacies if they expect their health insurance to cover the costs. In Model *B1*, its coefficient is expected to be positive for standard moral hazard reasons (since insured patients do not face the full cost of such purchases).

Variables related to a patient's age (*Age* ≤ 5, etc) and gender (*Female*) provide further controls reflecting potential severity, and/or cultural factors reflecting

prioritisation of different age or gender groups. Table 7.2 summarises the explanatory variables used in the regression analyses.

Table 7.2: Explanatory variables for regression analyses

Variable	Description	Model & expected coefficient			
		A1	A2	A3	B1
PHARMACY CHARACTERISTICS					
Link Public Dr	Pharmacy is owned by, or has familial link with, a public hospital physician	+	+	J.Ref.	NA
Link Pvt Dr	Pharmacy is owned by, or has familial link with, a private physician	J.Ref.	J.Ref.	+	NA
Indpt	Pharmacy is independently owned (i.e. not by a physician)	J.Ref.	J.Ref.	J.Ref.	NA
(these variables are exhaustive: Indpt + Link Public Dr or Indpt + Link Pvt Dr are the joint reference group)					
Location	Pharmacy is located in immediate vicinity of a public hospital	+	+	NA	+/-
[District]	Pharmacy is located in [District]	+/-	+/-	+/-	+/-
(District is one of Abuyog, Bais, Bayawan, Guilhulgnan, Oras, Palompon or Taft. These variables are exhaustive, with Bayawan the reference group)					
PHARMACY CUSTOMER CHARACTERISTICS					
Pres.type 1 + LPUBDR	Patient has prescription type 1 & used pharmacy linked to public physician	NA	NA	NA	++
Pres.type 1 + OTHPHARM	Patient has prescription type 1 & did not use pharmacy linked to public physician	NA	NA	NA	+
Pres.type 2 + LPUBDR	Patient has prescription type 2 & used pharmacy linked to public physician	NA	NA	NA	++
Pres.type 2 + OTHPHARM	Patient has prescription type 2 & did not use pharmacy linked to public physician	NA	NA	NA	+
Pres.type 3 + LPUBDR	Patient has prescription type 3 & used pharmacy linked to public physician	NA	NA	NA	+
Pres.type 3 + OTHPHARM	Patient has prescription type 3 & did not use pharmacy linked to public physician	NA	NA	NA	Ref.
OTC + LPUBDR	Patient does not have prescription & used pharmacy linked to public physician	NA	NA	NA	-
OTC + OTHPHARM	Patient does not have prescription & did not use pharm. linked to public physician	NA	NA	NA	--
(these variables are exhaustive, with Pres.type 3 + OTHPHARM the reference group)					
CM1 – CM14	Case-mix variables, reflecting type of illness for which medication was purchased.	+	+	+	+
(these variables are exhaustive, with patients buying medicine for cold/cough the reference group)					
HH Assets	Household asset index, derived from principal components analysis	+/-	+/-	+/-	+
HH Income	Reported annual household income	+/-	+/-	+/-	+
PHIC insured + claim	Patient has PHIC insurance and will claim reimbursement for pharmacy purchase	+	+	+	+
Age of patient	Patient's age (5 groups: patient age is <=5, 6-17, 18-39, 40-59, 60+)	+/-	+/-	+/-	+/-
(these variables are exhaustive, with patients aged 60 years or older the reference group)					
Female	Patient is female.	+/-	+/-	+/-	+/-

*Key to prescription types: 1=from pharmacy-owning public hospital physician; 2=from other public hosp physician; 3=from other non-hospital physician

Variables used in simulated health expenditure analysis (Model B2)

For Model *B2*, analysis was based on the price and availability of selected medicines, in both private pharmacies and public hospitals. Twenty-nine medicines were included, reflecting:

- Core medicines that treat acute and chronic conditions causing a significant share of the global burden of disease, as identified by the WHO and Health Action International (HAI) and that were used in the HAI Philippine survey (<http://www.haiweb.org/medicineprices>);
- Medicines for which availability was asked for in the QIDS facility survey.

Table 7.3: Medicines for which price and availability data was collected

Medicine	Dosage form	Reason for inclusion	Prescribed*
Aciclovir	tablet/capsule	WHO / HAI	No
Amitriptyline	tablet/capsule	WHO / HAI	No
Amoxicillin	tablet/capsule	WHO / HAI	Yes
Ampicillin	tablet/capsule	QIDS facility survey	No
Atenolol	tablet/capsule	WHO / HAI	No
Beclometasone inhaler	inhaler	WHO / HAI	No
Captopril	tablet/capsule	WHO / HAI	Yes
Ceftriaxone inj	vial injection	WHO / HAI	No
Cefalexin	tablet/capsule	QIDS facility survey	Yes
Chloramphenicol	tablet/capsule	QIDS facility survey	Yes
Ciprofloxacin	tablet/capsule	WHO / HAI	No
Co-trimoxazole paed	suspension	WHO / HAI	Yes
Diclofenac	tablet/capsule	WHO / HAI	Yes
Erythromycin	tablet/capsule	QIDS facility survey	No
Fluconazole	tablet/capsule	WHO / HAI	No
Fluoxetine	tablet/capsule	WHO / HAI	No
Glibenclamide (glyburide)	tablet/capsule	WHO / HAI	Yes
Hydrochlorothiazide	tablet/capsule	WHO / HAI	No
Metronidazole	tablet/capsule	QIDS facility survey	Yes
Nevirapine	tablet/capsule	WHO / HAI	No
Nifedipine	tablet/capsule	WHO / HAI	Yes
Ofloxacin	tablet/capsule	QIDS facility survey	Yes
Omeprazole	tablet/capsule	WHO / HAI	No
Oral rehydration salts	tablet/powder	QIDS facility survey	Yes
Paracetamol	tablet/capsule	QIDS facility survey	Yes
Phenoxymethyl penicillin	tablet/capsule	QIDS facility survey	No
Ranitidine	tablet/capsule	WHO / HAI	Yes
Salbutamol inhaler	inhaler	WHO / HAI	No
Tetracycline	tablet/capsule	QIDS facility survey	No

*prescribed by a pharmacy-owning public hospital physician and bought by patient/s in private pharmacy during exit survey

Pharmacists were asked if the medicine was available in a specified dosage form, and if so its price at all available dosage strengths.

7.2.4 Regression diagnostics

This section performs various regression diagnostics to check for and, if necessary, correct econometric problems. The theoretical rationales for the regression diagnostics used in this chapter are, unless stated, identical to those in the previous chapter (see section 6.2.5), and thus are not repeated here.

Outliers, Leverage and Influence

In all models, explanatory variable odds ratios/coefficients remained of the same direction/sign and had similar Z or t values after removal of influential observations. Furthermore, in models *A1* and *B1*, all odds ratios/coefficients also retained very similar values. In Models *A2* and *A3*, though, noticeable increases to the already high odds ratios for their pharmacy ownership variable – *Link Public Dr* for *A2* and *Link Pvt Dr* for *A3* – occurred (although with similar statistical confidence intervals because of increased standard errors).

Closer inspection of these influential observations showed that they shared relatively unique combinations of their model's dependent variable and the pharmacy ownership explanatory variable. In Model *A2*, this was observations where the pharmacy customer had a prescription from a pharmacy-owning public physician (PPUBDRWP=1) and visited a pharmacy *not* owned by a public physician (*Link Public Dr*=0). Similarly, in Model *A3*, the influential observations were those where the customer had a prescription from a pharmacy-owning private physician (PPVTDRWP=1) and visited a pharmacy *not* owned by a private physician (*Link Pvt Dr*=0). That is, it was already rare for a customer to have a prescription from a pharmacy-owning physician and not use the physician's pharmacy (only 6% of customers in Model *A2*, and 2% of customers in Model *A3*). After removing influential observations (which shared this characteristic), this became rarer still, and thus the odds ratio became even higher.

Data clustering

For all models, the intraclass correlation was statistically significant at the pharmacy level (at the 99% level, with intraclass correlations ranging from 0.25 to 0.47). Data clustering at the district level was of some significance in Models *A1* and *B1* (at the 90% level, with intraclass correlations of 0.13 and 0.1 respectively), and insignificant in all other models.

Whilst some dummy variables have been included to reflect various pharmacy and district level characteristics (see table 7.2), the high level of data clustering at the pharmacy level suggests that it needs to be adjusted for in the modelling process. This was done by using the `cluster` command in Stata (and `clttest` for *t* tests).

Specification errors

For the logit models (*A1*, *A2* and *A3*), a link test was performed to evaluate model specification. For the OLS model (*B1*), a regression specification error test (RESET) using non-linear transformations of fitted values was also performed. No problems were revealed: the predicted value was significant and the predicted value squared was non-significant in all model variants. Further, for the RESET test, the associated F-values were not significant.

Multicollinearity

In all of the regression models (*A1*, *A2*, *A3* and *B1*), there was no evidence of significant multicollinearity, with 1/VIF values always higher than 0.25.

Heteroscedasticity

Some evidence of heteroscedasticity was found in Models *A1* and *A2* through the variable AGE5 (no evidence was found in Model *A3*). However, this did not noticeably change regression results: all variables in the heteroscedastic-adjusted probit model other had near equivalent coefficients (the same sign and similar magnitude), standard errors and z statistics to the homoscedastic probit model. That

is, variables were not statistically different across the heteroscedastic-adjusted and homoscedastic models. Thus for consistency across Model A variants, and for ease of interpretation, this limited heteroscedasticity was not adjusted for in the final regression results presented. For Model *B1*, plots of residual versus fitted values were inspected, and heteroscedasticity was tested for using the Breusch-Pagan test. In both the full sample and sub-sample model variants, the null hypothesis of homogenous variance could not be rejected.

Endogeneity

There is no obvious theoretical reason to expect any of the explanatory variables to be endogenous to either the probability of a patient receiving a prescription from a pharmacy-owning physician (Models *A1*, *A2* and *A3*), or health expenditure (Model *B1*).

7.3 Results

7.3.1 Descriptive statistics

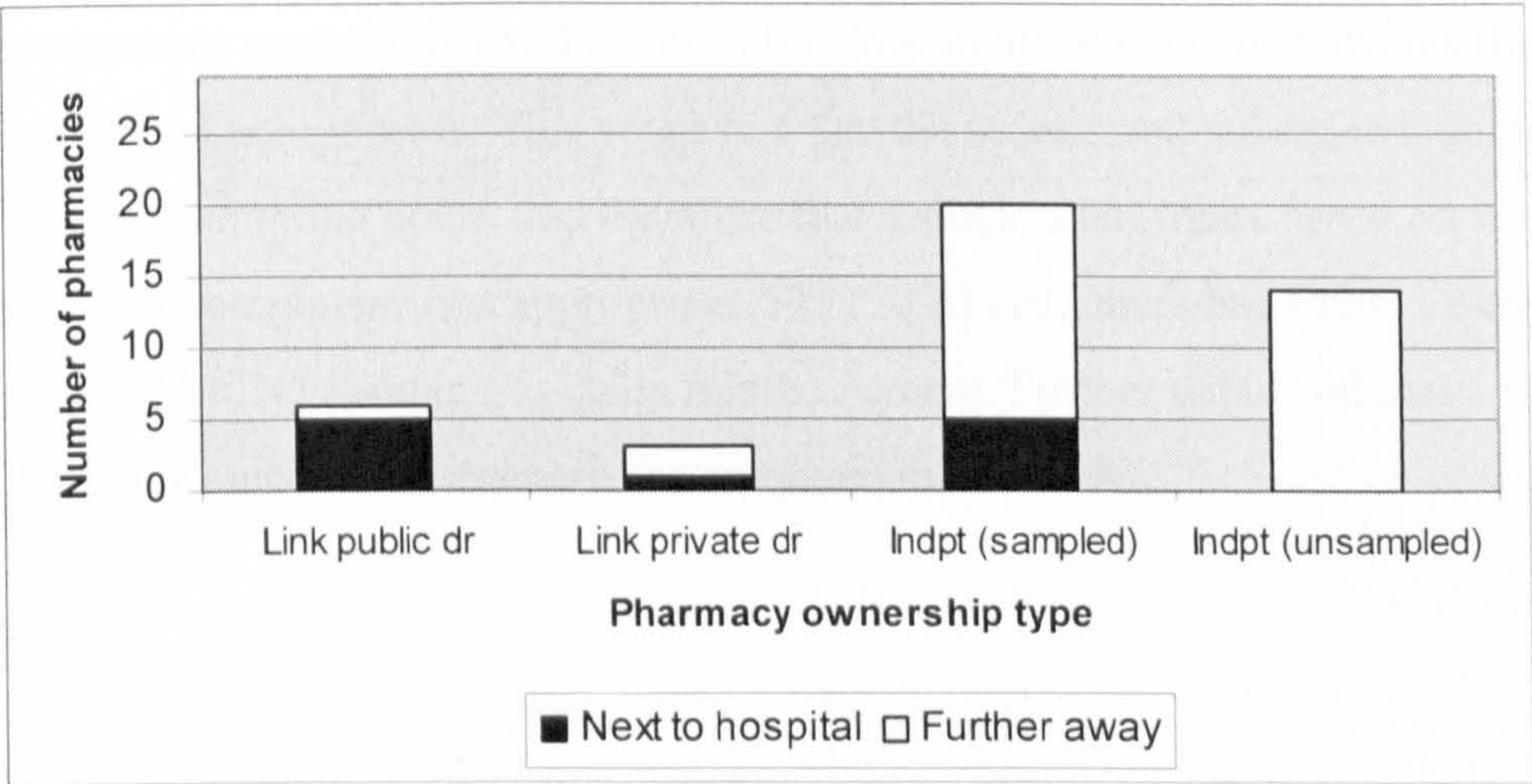
Pharmacy exit survey – pharmacy characteristics

Exit surveys were conducted in 29 private pharmacies across 7 towns. 12 pharmacies were in QIDS ‘access’ sites, 8 were in QIDS ‘bonus’ sites and 9 were in control sites. In terms of ownership, 6 had links with a public hospital physician. That is, in every site other than Bais district, there was 1 sampled pharmacy owned by a public physician. Note, though, that in Abuyog district, ownership was by a collective of all public hospital workers, rather than an individual physician.

Three pharmacies had links with a private clinic physician. Two of these pharmacies were located in Bayawan district, one was located in Palompon district. The remaining 20 pharmacies were independent (typically owned by local pharmacists). Finally, 11 of the 29 pharmacies were located in the direct vicinity of the town’s public hospital; 18 were located five to thirty minutes walk away from the hospital.

Figure 7.1 illustrates where pharmacies of each ownership type were located.

Figure 7.1: Pharmacy characteristics: ownership types and location



Pharmacy exit survey – pharmacy customer characteristics

A total of 1350 pharmacy customers were surveyed (a further 4 customers refused to be interviewed). Of these, 22 observations had missing or incorrectly inputted values, giving an effective sample size of 1322. From this sample, 348 customers used pharmacies linked with public physicians; 153 used pharmacies linked with private physicians; and the remaining 821 used independent pharmacies.

Just under half of the sample (625 of 1322) had a prescription, whilst 697 (53%) customers made over-the-counter (OTC) purchases. Of those with a prescription, 425 (32%) had a prescription from a public hospital physician – 221 (17%) from a pharmacy-owning public physician and 204 (15%) from other public physicians. Further, 77 (6%) customers had prescriptions from a pharmacy-owning private physician, with 123 (9%) having prescriptions from other health professionals (working predominantly in other private clinics or rural health units).

Over 60% of the sample reported household incomes that were in the bottom income quintile (based on national-level data from Philippine National Statistics Office website: <http://www.census.gov.ph/data/sectordata/2003/ie03fr18.htm>). That is, their household income was less than 51,000 Pesos (2006 prices). Asset ownership was positively correlated with reported household income. Results from principal components analysis showed a noticeable drop in the eigenvalue between the first and second components. This suggested that the second and subsequent components were just sampling noise, and therefore that a single asset index based on the first principal component was appropriate. 393 (30%) customers had PHIC insurance, with 132 (10%) planning to claim reimbursement. Further details on these and other pharmacy customer characteristics are given in table 7.4.

Table 7.4: Pharmacy customer characteristics

Variable	N	%
OTC v PRESCRIPTIONS, & PRESCRIPTION TYPE		
Over-the-counter purchase	697	53%
Prescription from pharmacy-owning public physician	204	15%
Prescription from other public physician	221	17%
Prescription from pharmacy-owning private physician	77	6%
All other (i.e. non-hospital based) prescriptions	123	9%
SOCIOECONOMIC / DEMOGRAPHIC CHARACTERISTICS		
Household assets		
Radio	1093	83%
TV	930	70%
Refrigerator	594	45%
Washing machine	244	18%
Air conditioning	57	4%
Sala (living room) set	321	24%
Cell phone	735	56%
Car	110	8%
Annual household income		
<10,000	317	24%
10,001-25,000	307	23%
25,001-50,000	228	17%
50,001-75000	157	12%
75,001-100,000	93	7%
100,001-150,000	99	7%
150,001-200,000	50	4%
200,001-600,000	67	5%
>600,000	4	0%
Health insurance status of patient		
PHIC member and will claim	132	10%
PHIC member but won't claim	393	30%
Not PHIC member	797	60%
Age of patient		
Age <=5	204	15%
Age 6-17	146	11%
Age 18-39	357	27%
Age 40-59	364	28%
Age 60+	251	19%
Gender of patient		
Female	730	55%

7.3.2 Can physicians influence a patient's drug purchasing behaviour?

Cross-tabulations

Individuals with a prescription from a pharmacy-owning physician are much more likely to use that physician's pharmacy than any other pharmacy, as shown in Table 7.5. For instance, of those customers visiting a pharmacy with familial links to a public hospital physician, 58% had a prescription from a pharmacy-owning public physician. This is a statistically higher proportion than that for customers visiting other pharmacies, where only 6% of customers had such a prescription (p -value < 0.0001).

The difference is equally noticeable when comparing prescriptions received from any public hospital physician: for customers visiting a pharmacy linked with a public hospital physician, 73% had a prescription from a public hospital physician, in contrast to 18% for those customers visiting all other pharmacies (difference statistically significant, with p -value < 0.0001).

Similar results are also found when comparing prescriptions received from a pharmacy-owning private physician. For customers visiting a pharmacy linked with a private physician, 46% had a prescription from a pharmacy-owning private physician, in contrast to 2% for those customers visiting all other pharmacies (difference statistically significant, with p -value < 0.0001).

Table 7.5: Pharmacy customers with prescription, by pharmacy ownership type

a. Prescription from (any) public hospital physician	Received Prescription?				Total
	Yes		No		
- Pharmacy linked with public hospital physician	255	(73%)	93	(27%)	348
- All other pharmacies	171	(18%)	803	(82%)	974
Total	426	(32%)	896	(68%)	1322
chi-squared (p-value)	364.5		p < 0.0001		

b. Prescription from pharmacy-owning public hospital physician	Received Prescription?				Total
	Yes		No		
- Pharmacy linked with public hospital physician	166	(58%)	122	(42%)	288
- All other pharmacies	38	(6%)	623	(94%)	661
Total	204	(21%)	745	(79%)	949
chi-squared (p-value)	320.1		p < 0.0001		

c. Prescription from pharmacy-owning private physician	Received Prescription?				Total
	Yes		No		
- Pharmacy linked with public hospital physician	71	(46%)	82	(54%)	153
- All other pharmacies	6	(2%)	347	(98%)	353
Total	77	(15%)	429	(85%)	506
chi-squared (p-value)			p < 0.0001		

A closer look at the sub-group of pharmacies owned by a public physician showed that the percentage of customers with a prescription from a public hospital physician was not homogenous across this sub-group. Whilst one of these pharmacies had a percentage identical to the average (73%), for two other pharmacies, the figure was considerably lower (43% and 47%), and for the remaining three pharmacies, the figure was 85% or higher.

The reasons given by customers for using physician-owned pharmacies provide some further insights into the ability of physicians to influence a patient’s drug purchasing behaviour (see table 7.6). For example, amongst the customers with a prescription from a pharmacy-owning public physician and using that physician’s pharmacy, 61% cited the influence of a health professional as the main reason. In particular, 52% said they were recommended, and 9% referred, by a health professional. Indeed, one customer in this sub-sample who sited an “other” reason, said that the main reason she went to this pharmacy was because when she returned to the hospital where her child was admitted, the “doctor advised that if I buy in other drugstore [the] purchased medicine will be returned [i.e. not used by the

doctor, even though it is needed to treat her child]”. It is possible that more interviewed customers had a similar explanation, but did not volunteer such information since it was not listed as an option in the questionnaire.

The respective figure for customers with prescriptions from other public physicians was 26% (23% recommended, 3% referred). This difference (26% v 61%) was statistically significant (chi-squared=5.29, *p*-value<0.025). Note, though, that non-combined comparisons of customers being recommended, or being referred, were not statistically significant.

Table 7.6: Reasons given by customers for using a particular pharmacy

Reason customer used a particular pharmacy	Customer had a prescription from...							
	...pharmacy-owning public doctor & used that doctor's pharmacy (n=166)				...other public doctor (n=222)			
	One of reasons		Main reason		One of reasons		Main reason	
Proximity to home	24	14%	5	3%	59	27%	28	13%
Proximity to work	4	2%	3	2%	24	11%	8	4%
Proximity to hospital	14	8%	12	7%	41	18%	35	16%
Knew medicine/s was available here	35	21%	20	12%	140	63%	52	23%
Knew medicine/s was cheap here	18	11%	15	9%	72	32%	35	16%
Recommended by health professional	88	53%	86	52%	77	35%	52	23%
Referred here	15	9%	15	9%	6	3%	6	3%
Other	12	7%	10	6%	6	3%	6	3%

Regressions

Logistic regression analysis produced results that were broadly consistent with these cross-tabulation analyses (see tables 7.7a, b and c). Model *A1* showed that pharmacy customers using a pharmacy owned by a public physician had 5.4 times higher odds of receiving a prescription from a public physician, as compared with customers using pharmacies not owned by a public physician.

Alternative model specifications gave more pronounced results. Model *A2* demonstrated that the odds of a pharmacy customer receiving a prescription from a pharmacy-owning public hospital physician were 16.6 times higher for customers using a pharmacy owned by a public physician, as compared with all other

customers. In Model *A3*, the odds of a pharmacy customer receiving a prescription from a pharmacy-owning private physician are 82.7 times higher for customers using a pharmacy owned by a private physician, as compared with all other customers. These extremely high odds ratios can be explained by the rarity of a customer having a prescription from a pharmacy-owning physician and not using that physician's pharmacy (see tables 7.5b and 7.5c, and discussion on outliers in section 7.2.5).

Many of the other explanatory variables also had odds ratios significantly greater than one. For instance, pharmacy customers with a prescription from a public physician (Model *A1*) / pharmacy-owning public physician (Model *A2*) had 6.15 / 4.5 times higher odds of using pharmacies located in the immediate vicinity of the town's public hospital than other pharmacies. There was noticeable variability across districts, with pharmacy customers from Palompon and Taft districts most likely to have prescriptions from a public physician (Model *A1*). These were both QIDS access sites, although pharmacy customers in Bais, also an access site, were only the fifth most likely of seven district customer sets to have prescriptions from a public physician.

Those with PHIC insurance and planning to claim were more likely to have prescriptions from a physician (public or private). Patients aged over 60 and/or those aged under 5 were the most likely to have prescriptions from a physician (public or private). Socioeconomic status (as measured by *HH Assets* or *HH Income*) and gender were statistically insignificant in all three models. Case-mix variables had odds ratios that reflected their severity relative to the reference case of a 'cold/cough', with pharmacy customers reporting more severe illnesses being more likely to have a prescription from a public or private physician. Table 7.7a, b and c shows the results for each regression model.

Table 7.7a: Regression results, Model A1

A1: Probability of prescription from (any) public hospital physician		N = 1322. Wald chi2=738 (Prob>chi2 <0.001) Log pseudolikelihood = -521.4 Pseudo R2 = 0.3725; AIC*n = 1084.8	
Variable	O.R.	se	P> z
Pharmacy linked to public doctor	5.427	2.17	<0.0001
Pharmacy located next to hospital	6.152	2.20	<0.0001
Abuyog district	3.319	1.32	0.0020
Bais district	2.034	0.83	0.0810
Guilhulgnan district			
Palompon district	28.703	14.24	<0.0001
Oras district	6.172	2.31	<0.0001
Taft district	10.036	3.69	<0.0001
Household assets	0.502	0.26	0.1880
PHIC member and will claim	1.796	0.52	0.0430
Age <= 5			
Age 6-17			
Age 18-39			
Age 40-59	0.632	0.15	0.0520
Female			

Bayawan is reference district; case-mix proxies were also included.

Table 7.7b: Regression results, Model A2

A2: Probability of prescription from pharmacy-owning public hospital physician		N = 949. Wald chi2=644 (Prob>chi2 <0.001) Log pseudolikelihood = -263.5 Pseudo R2 = 0.4665; AIC*n = 551.0	
Variable	O.R.	se	P> z
Pharmacy linked to public doctor	16.629	11.999	<0.0001
Pharmacy located next to hospital	4.523	3.455	0.0480
Guilhulgnan district			
Palompon district	46.999	21.236	<0.0001
Oras district	1.552	0.408	0.0950
Taft district	4.728	0.948	<0.0001
Household assets			
PHIC member and will claim	2.961	0.888	<0.0001
Age <= 5	1.963	0.594	0.0260
Age 6-17			
Age 18-39			
Age 40-59	0.447	0.136	0.0080
Female			

5 District analysis (excludes Abuyog and Bais). Bayawan is reference district; case-mix proxies were also included.

Table 7.7c: Regression results, Model A3

A3: Probability of prescription from pharmacy-owning private physician		N = 506. Wald chi2=644 (Prob>chi2 <0.001) Log pseudolikelihood = -116.6 Pseudo R2 = 0.4596; AIC*n = 257.2	
Variable	O.R.	se	P> z
Pharmacy linked to public doctor	82.689	43.635	<0.0001
Palompon district			
Household assets			
PHIC member and will claim	2.097	1.274	0.2230
Age <= 5	4.586	2.514	0.0050
Age 6-17			
Age 18-39	0.312	0.194	0.0610
Age 40-59	0.459	0.237	0.1310
Female	1.741	0.685	0.1590

2 District analysis (only Bayawan and Palompon). Bayawan is reference district; case-mix proxies were also included.

7.3.3 Are patients spending more on prescribed medicine than they need to? Analysis of pharmacy expenditures

Cross-tabulations

Data on pharmacy expenditure shows that customers using pharmacies with links to a public hospital physician spent more than those using other pharmacies:

Table 7.8: Average patient health expenditure (in PHP)

OTC v Prescription, & if prescription where from	All pharmacies		Link public dr		Link private dr		Independent	
	Mean	N	Mean	N	Mean	N	Mean	N
Over-the-counter (OTC)	58	697	56	82	67	34	59	581
Prescription...	261	625	358	266	212	119	178	240
–from hospital doctor (all)	299	425	366	255	185	31	202	139
pharmacy-owning hospital doctor	335	204	379	166	135	5	143	33
all other hospital doctors	267	221	342	89	195	26	221	106
–from non-hospital doctor (all)	180	200	165	11	222	88	145	101
pharmacy-owning non-hospital dr	222	77	100	2	227	71	189	4
all other non-hospital doctors	154	123	180	9	200	17	144	97
ALL RESPONDENTS	155	1322	287	348	180	153	94	821

In particular, people purchasing medicines from pharmacies owned by public physicians spent an average of 287PHP per visit. This compares with 94PHP spent by those using independent pharmacies (p -value<0.0001), and 180PHP spent in pharmacies owned by private pharmacies (but p -value=0.1611). Note that all reported statistical tests in this section on cross-tabulation results were based on one-

sided *t* tests of means of logged health expenditure, with unequal variance between comparison groups.

However, many of these differences are likely to be explained by variation in severity of illness rather than pharmacy type per se. People with prescriptions spend more than those making over-the-counter (OTC) purchases: an average of 261PHP as compared with 58PHP. This is relevant as public physician owned public pharmacies have a much smaller proportion of customers making OTC purchases as compared with independent pharmacies. Moreover, those with prescriptions from hospital physicians typically spend more than those with prescriptions from elsewhere (299PHP v 180PHP, p -value<0.0001). Public physician owned public pharmacies have a greater proportion of customers with prescriptions from the hospital, as compared with other pharmacy types.

Still, differences in health expenditures across pharmacy ownership types remain even after an initial control for severity of illness. For instance, in the sub-sample of patients with a prescription from a hospital physician, those visiting pharmacies owned by a public physician spent 366PHP, significantly more (p -value<0.01) than both those visiting pharmacies owned by private physicians (185PHP) and those visiting independent pharmacies (202PHP).

Further, customers with prescriptions from pharmacy-owning public physicians spent somewhat more than those with prescriptions from other public physicians (335PHP V 267PHP, but p -value=0.1164). This higher expenditure of customers with prescriptions from pharmacy-owning physicians, though, only occurs in pharmacies owned by public physicians (379PHP v 342PHP). Customers with prescriptions from pharmacy-owning physicians using other pharmacies spent somewhat less than customers with prescriptions from other public physicians in non-public physician owned pharmacies (143v221PHP in independent pharmacies; 135v195PHP in private physician-owned pharmacies, or 142v215PHP in aggregate).

Note, though, that none of these within-pharmacy ownership type expenditure differences are statistically significant.

Looking more closely at the sub-group of pharmacies owned by a public physician, average health expenditures for customers with a prescription from a public hospital physician were between 243-348PHP in 5 of the 6 pharmacies (n=288), but 776PHP in 1 of the 6 pharmacies (n=60). This difference was of marginal statistical significance (p -value=0.0838).

Regressions

Results of multivariate OLS regressions show that only under certain circumstances did customers purchasing medicines from pharmacies owned by a public physician spend more than customers using other pharmacies (see table 7.9). Those using pharmacies linked to public physicians and with a prescription from a *pharmacy-owning* public physician spent 40.5% more (p -value=0.023) than the reference group of customers using other pharmacies and with a prescription from a non-hospital physician. Yet customers using these public physician-linked pharmacies and with a prescription from other *non-pharmacy owning* public hospital physicians also spent more than the reference group (52.6% more, p -value=0.022).

In contrast, customers with prescriptions from a pharmacy-owning public physician but using non-physician linked pharmacies (*Pres.type 1 + OTHPHARM*) did not spend a statistically different amount to the reference group. This was also the case for customers using non-physician linked pharmacies and with prescriptions from other public physicians (*Pres.type 2 + OTHPHARM*); and customers using public physician-linked pharmacies and with a prescription from a non-hospital physician (*Pres.type 3 + LPUBDR*). Finally, customers without a prescription – i.e. making over-the-counter purchases – spent significantly less (over 100% less) than the reference group, whichever pharmacy type they used.

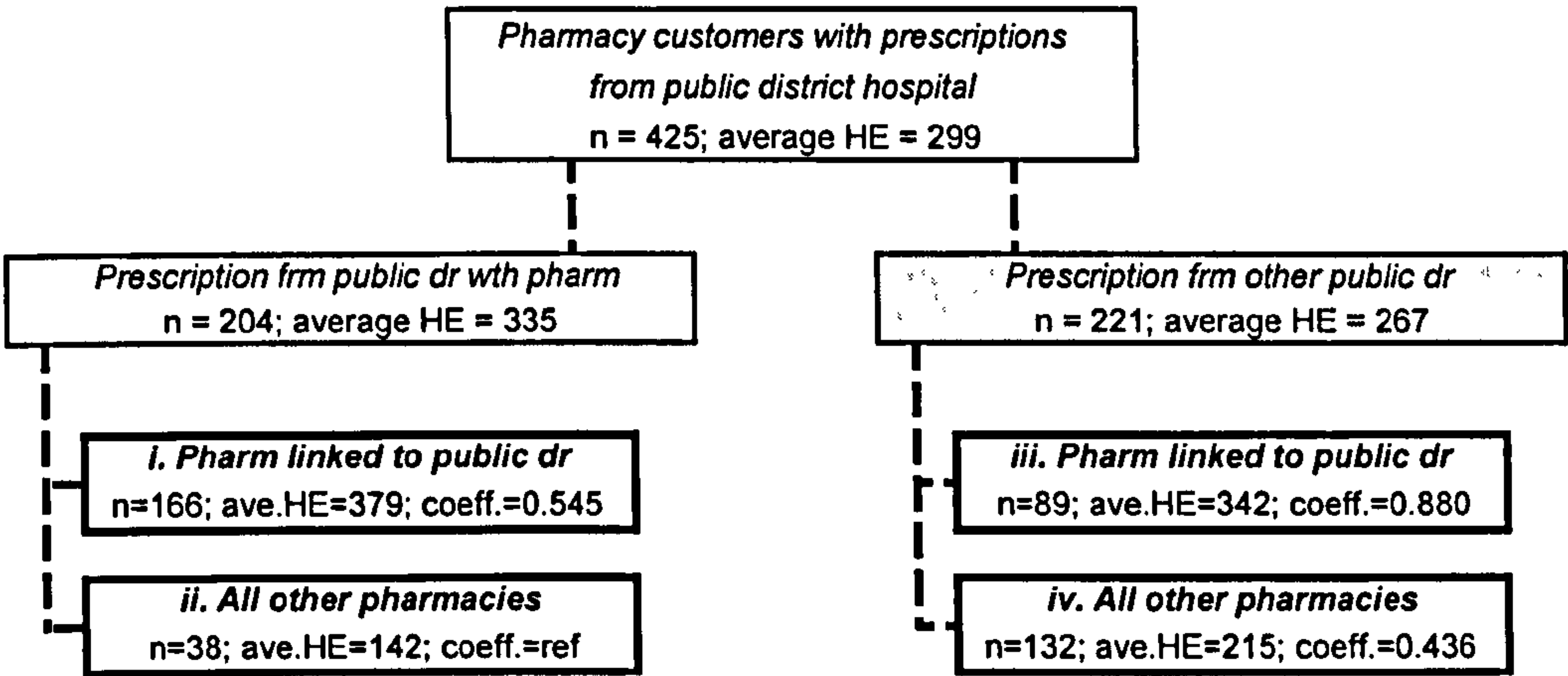
Regressions of the sub-sample of pharmacy customers with a prescription from a public hospital physician help clarify these results. A first regression, which simplified the dummies to a single ownership dummy and a single prescription dummy (see table 7.10a), showed that customers using a public physician-linked pharmacy spent 49.3% more (p -value=0.005) than those using other pharmacies. However, it also showed that those with a prescription from a pharmacy-owning public physician spent 37.4% (although p -value=0.048) *less* than those with prescriptions from other public physicians.

A second regression provides further insights into these unusual results (see table 7.10b). It compared four customer sub-groups:

1. Customers with prescriptions from pharmacy-owning public physicians and using their pharmacies;
2. Customers with prescriptions from pharmacy-owning public physicians but using pharmacies not linked to public physicians (regression reference group);
3. Customers with prescriptions from non-pharmacy owning public physicians but using pharmacies linked to public physicians;
4. Customers with prescriptions from non-pharmacy owning public physicians and using pharmacies not linked to public physicians.

Of these, the second sub-group spent significantly less than all other sub-groups (regression coefficients indicate between 43.6%-88% less). That is, it is this sub-group that explains lower expenditure regression estimates for pharmacy customers with prescriptions from pharmacy-owning physicians as compared with non-pharmacy-owning physicians. Figure 7.2 helps illustrate this, by showing average health expenditures along with regression coefficients for these four customer sub-groups.

Figure 7.2: Health expenditures, by prescription and pharmacy ownership types



Many of the control variables also had statistically significant coefficients. Customers using pharmacies located in the immediate vicinity of a town’s public hospital spent 28.5% more than those using other pharmacies (*p*-value=0.032). As with Models *A1* and *A2*, there was variability in results across districts. Pharmacy customers in Palompon district spent the most; customers in Bais spent the least.

Customers with insurance and planning to claim spent 21.2% more than others (*p*-value=0.014). A 10% increase in socioeconomic status (as measured by *HH Assets*) was associated with a 7.48% increase in health expenditure (*p*-value=0.001). Pharmacy customers reporting more severe illnesses (as measured by case-mix variables) had the same or higher expenditures than those with the reference case of a ‘cold/cough’. Age and gender were significant determinants of health expenditure: significantly more was spent on patients aged less than 5 or greater than 60 than other age groups; 11.2% less was spent on female patients than male patients (*p*-value=0.081).

Table 7.9: Regression results, Model B1

B1: Determinants of health expenditure (log HE), full sample		N = 1322; F = 197 (Probability>F <0.001) R2 = 0.3801; AIC = 4004.7	
Variable	Coefficient	se	P> t
Pres.type 1 + used LPUBDR	0.405	0.169	0.0230
Pres.type 1 + used other pharmacy	-0.199	0.214	0.3590
Pres.type 2 + used LPUBDR	0.526	0.217	0.0220
Pres.type 2 + used other pharmacy	0.076	0.198	0.7020
Pres.type 3 + used LPUBDR	-0.198	0.453	0.6660
OTC, used LPUBDR	-1.096	0.180	<0.0001
OTC, used other pharmacy	-1.529	0.253	<0.0001
Pharmacy located next to hospital	0.285	0.127	0.0320
Abuyog district			
Bais district	-0.386	0.150	0.0160
Guilhulgnan district			
Palompon district	0.320	0.172	0.0740
Oras district			
Taft district	-0.201	0.192	0.3050
Household assets	0.748	0.209	0.0010
PHIC member and will claim	0.212	0.084	0.0180
Age <= 5			
Age 6-17	-0.263	0.100	0.0140
Age 18-39	-0.434	0.111	0.0010
Age 40-59	-0.325	0.096	0.0020
Female	-0.112	0.062	0.0810
Constant	4.491	0.222	<0.0001

Key to prescription types: 1=prescription from pharmacy-owning public hospital physician; 2=from other public hospital physician; 3=from other non-hospital physician. / *LPUBDR = pharmacy linked to public hospital physician.
Note: variables controlling for case-mix were also included.

Table 7.10: Sub-sample regressions for Model B1 (customers with prescription from public hospital)

a) Model B1: Pharmacy ownership and prescription dummies separated		N = 425; F = 24.4 (Probability>F <0.001) R2 = 0.1831; AIC = 1252.8	
Variable	Coefficient	se	P> t
Pharmacy linked to public doctor	0.493	0.169	0.0050
Pres.type 1	-0.374	0.180	0.0480
[2 reference groups = OTHPHARM and Prescription type 2]			
b) Model B1: Unadjusted model		N = 425; F = 20.7 (Probability>F <0.001) R2 = 0.1834; AIC = 1254.7	
Variable	Coefficient	se	P> t
Pres.type 1 + used LPUBDR	0.545	0.157	0.0020
Pres.type 2 + used LPUBDR	0.880	0.256	0.0020
Pres.type 2 + used other pharmacy	0.436	0.247	0.0900
[1 reference group = Prescription type 2 + used other pharmacy]			

Note: control variables used in original regression were also included.

7.3.4 Are patients spending more on prescribed medicine than they need to? Comparison of pharmacy expenditures with simulated generic expenditures

Medicine prices (from screening interview)

From the 29 medicines for which data was collected, 13 were prescribed by a pharmacy-owning public hospital physician and bought by patients in a sampled pharmacy during the exit survey. Table 7.11 gives the minimum, mean, median and maximum price of both the generic and cheapest brand versions of these medicines. These generic prices were used to calculated simulated generic expenditures.

Table 7.11: Price of selected medicines bought during exit survey (PHP)

Medicine	Dosage	Generic version						Cheapest Brand		
		n	Min	Mean	Median	Max1	Max2	n	Mean	t-stat
Amoxicillin	500mg/tab	38	3	4.8	4.25	9.0	10.7	26	13	12.4
Captopril	25mg/tab	25	4.5	9.0	6.5	25	25	23	31	17.8
Cefalexin	500mg/tab	20	7	10.2	10	16	16	19	26	8.1
Chloramphenicol	500mg/tab	30	3.25	5.2	5	8.65	9.8	23	42	12.8
Co-trimoxazole paed	200+40mg/susp	25	25	45.4	49	60	69	25	121	11.9
Dicolofenac	50mg/tab	25	3	4.9	5	9	9	4	22	22.4
Glibenclamide	5mg/tab	21	1.5	3.6	3.5	5	7	27	9	7.8
Metronidazole	500mg/tab	34	2	4.9	5	10	10	28	21	20.1
Nifedipine	5mg/tab	19	3	6.4	5.5	7	19.7	22	12	4.6
Ofloxacin	200mg/tab	9	8	25.9	26	40	40	25	53	5.4
Oral rehydration salts	tab/powder	-	-	-	-	-	-	34	11	-
Paracetamol	500mg/tab	37	0.85	1.2	1	2	3.25	34	3	18.5
Ranitidine	150mg/tab	22	5	12.3	10	25	30	29	24	4.6

* t-test of mean values of generic & cheapest brand versions, based on equal variances
 ** Max1=maximum across private pharmacies; Max2=maximum across private & hospital pharmacies

For all of these medicines, the price difference between the mean generic price and the lowest cost branded version was statistically significant at the 99% significance level (one-sided *t* test). Generic versions were more commonly available in private pharmacies and public hospitals than branded versions in 7 of the 13 medicines, but less frequently available for 4 of 13 medicines. Public hospital pharmacies rarely stocked branded versions (although branded ofloxacin was available in 2 of the 7 hospitals; and branded oral rehydration salts plus cefalexin were available in 1 hospital).

Table 7.12 compares the price of generic versions of these medicines in private pharmacies with public hospital pharmacies:

Table 7.12: Average generic prices in hospitals and private pharmacies

Medicine	Dosage	Hospital pharmacy		Private pharmacy		t-stat
		Price (PHP)	n	Price (PHP)	n	
Amoxicillin	500mg/tab	6.94	5	4.42	33	2.4*
Captopril	25mg/tab	14.67	3	8.24	22	1.4
Cefalexin	500mg/tab	11	3	10.09	17	1.1
Chloramphenicol	500mg/tab	7.65	2	5	28	1.2
Co-trimoxazole paed	200+40mg/susp	63.67	3	42.9	22	4.4*
Diclofenac	50mg/tab	6.6	2	4.74	23	2.8
Glibenclamide	5mg/tab	6	3	3.24	18	4.3*
Metronidazole	500mg/tab	4.31	4	4.98	30	-0.8
Nifedipine	5mg/tab	10.65	4	5.28	15	1.7
Ofloxacin	200mg/tab	26	1	25.88	8	-
Oral rehydration salts	tab/powder	-	-	-	-	-
Paracetamol	500mg/tab	1.81	4	1.1	33	1.4
Ranitidine	150mg/tab	30	1	11.44	21	-

*Statistically significant at the 95% level.

The mean price was lower in private pharmacies for 11 of the 13 medicines. These differences were statistically significant at the 95% level (one-sided *t* test) for amoxicillin, co-trimoxazole paed and glibenclamide. For other medicines, the significance of statistical tests was limited by their low availability in public hospital pharmacies.

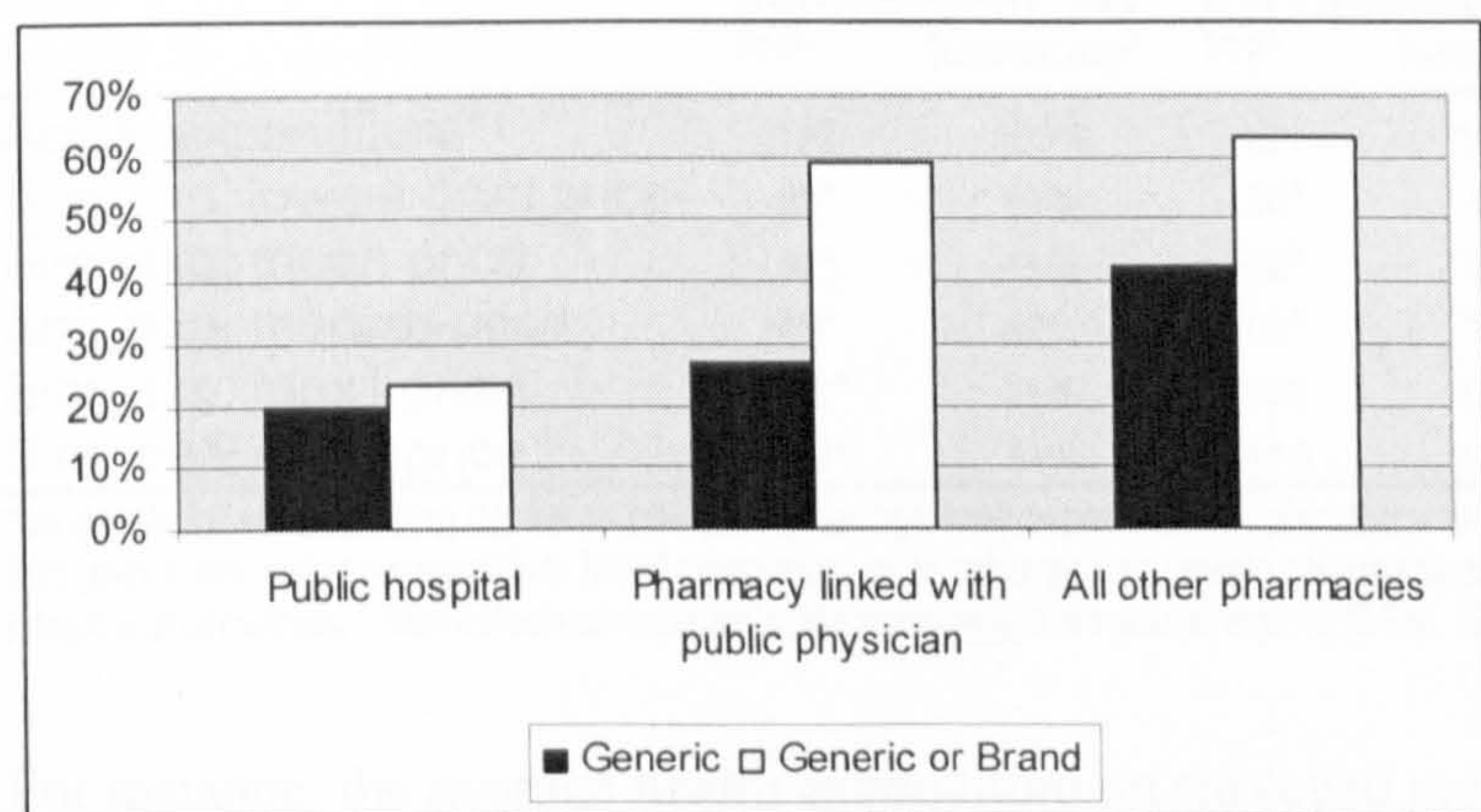
In other sub-sample comparisons, no consistent price differences were found between pharmacies owned by a public physician and other pharmacies, for either generic or branded medicines. However, pharmacies located next to a hospital did have higher mean generic prices than pharmacies further away, in 10 of the 11 medicines that were available in both pharmacy location types (for diclofenac and glibenclamide, these were only sold at pharmacies located next to the hospital). Such differences, though, were only statistically significant at the 95% level (one-sided *t* test) in the case of cefalexin. Further, there were no consistent price differences between these two pharmacy location types for branded medicines.

Medicine availability (from screening interview)

Medicine availability was higher in private pharmacies than in public hospitals, based on the 29 medicines for which data was collected: on average, 63% of these were available in private pharmacies – in either generic or branded form – as compared with 23% in public hospitals. This difference was less marked when looking at availability of generic versions (40% v 20%), but in both cases the differences were statistically significant at the 99% level (one-sided *t* test of means). Further, availability figures for hospitals should be interpreted as upper-end estimates: all hospital pharmacists reported regular stock shortages, and consequent medicine rationing.

Differences in general availability (i.e. generic or branded versions being available) between pharmacy ownership types were small and not statistically significant. However, availability of generic medicines was noticeably lower in pharmacies owned by public physicians: 27% as compared with 42% for all other pharmacies. This difference was statistically significant at the 95% level (one-sided *t* test of means). Figure 7.3 illustrates these differences in medicine availability:

Figure 7.3: Medicine availability – percentage of essential medicines available



Customer purchasing behaviour: generic and/or branded medicines?

Pharmacy customers frequently purchase branded medicines in preference to generic versions, even though generics are often available. From the 1350 customers sampled, 991 (73.4%) purchased only branded medicine/s, 152 (11.3%) purchased branded and generic medicines, whilst 207 (15.3%) purchased only generic medicine/s.

A similar pattern is discernible for the sub-sample of customers with a prescription from a pharmacy-owning public physician: 142 (68%), 42 (20%) and 26 (12%) were the equivalent figures for purchasing branded and/or generic medicines. Given that there are significant price differences between generic and branded versions (see, for instance, table 7.11), many pharmacy customers would spend markedly less on medicines if they purchased generic medicines.

Simulation results

Results from the simulation analysis show the extent of potential savings if generics rather than branded medicines were purchased, as table 7.13 shows.

Table 7.13: Actual v Simulated average expenditures on surveyed medicines

	Branded drugs purchased(n=32)		Only generics purchased(n=16)		Full sub-sample (n=48)	
	PHP	%actual exp*	PHP	%actual exp*	PHP	%actual exp*
Actual expenditure*	153	100%	121	100%	142	100%
Sim_exp, lowest drug price	29 ^a	19%	50 ^a	41%	36 ^a	25%
Sim_exp, mean price	62 ^a	41%	82 ^a	68%	69 ^a	49%
Sim_exp, median price	65 ^a	42%	88 ^b	73%	73 ^a	51%
Sim_exp, max1 price	109 ^a	71%	153	126%	124 ^c	87%
Sim_exp, max2 price	124 ^c	81%	170	140%	139	98%

*on drug/s for which pricing data was collected (average total expenditure in pharmacy is higher).
Sim_exp = simulated expenditure; Max1=maximum drug price across private pharmacies; Max2=maximum across private & hospital pharmacies. / Simulated expenditure statistically less than actual exp. at ^a99%, ^b95%, ^c90% significance level.

For instance, the average health expenditure on surveyed medicines was 153PHP for those purchasing branded medicines. This compared with an expenditure of:

- 29PHP (19% of actual expenditure) if the generic medicine price equalled the lowest generic price in the sample, difference statistically significant (p -value<0.0001).
- 62/65PHP (41/42% of actual expenditure) if prices equalled the median/mean generic price, difference statistically significant (p -value<0.0001).
- 109PHP (71% of actual expenditure) if prices equalled the highest private pharmacy generic price, difference statistically significant (p -value=0.0043).
- 124PHP (81% of actual expenditure) if prices equalled the highest generic price (private or hospital pharmacy), difference of some statistical significance (p -value=0.0642).

Note that estimates of statistical significance are based on one-sided t test of means. Expenditure differences for the full sub-sample are less marked, since this includes customers who already only purchased generics.

Extrapolating these results to all pharmacy customers with a prescription from a pharmacy-owning public hospital physician shows that noticeable expenditure savings could be generated. For the 88% of these customers who purchased branded medicines, expenditure could be reduced by 58% on average (median), saving 194PHP (US\$4.6) per prescription (their average expenditure was 335PHP / US\$7.7), if they purchased generic medicines.

It is important to note that this extrapolation of results assumes:

- (1) Price differences between generic and branded versions for other medicines are the same as medicines analysed in the simulation sub-sample;
- (2) Generic medicines would be competitively priced in public hospitals;
- (3) Generic versions are always available in public hospitals.

Further, the specification of model *B2* assumed that quantities of medicines purchased would be the same if patients with a hospital-based prescription purchased the medicines inside the hospital. Results weakly suggest this may not be

the case: pharmacy customers with prescriptions from pharmacy-owning public physicians purchased slightly more medicine items per visit than other hospital physicians: 1.73 compared with 1.6 (i.e. an 8% difference). This difference is of some statistical significance (p -value=0.061, one sided t test of means). It implies that average savings would be somewhat higher than the 194PHP estimated above, although it is not possible to estimate the likely magnitude.

7.4 Discussion

7.4.1 Evaluation of testable hypotheses

Hypothesis 7: Doctors owning (or having financial links with) external ancillary health facilities will refer patients to such facilities.

Empirical proxy: Physicians owning, or with direct familial links to, a private pharmacy will encourage patients to purchase medicines from their pharmacy.

Results from this study showed that pharmacy-owning physicians are able to persuade patients to use their pharmacy in preference to alternative pharmacies (Model A). For instance, cross-tabulations showed that 57% of customers in public physician-owned pharmacies had a prescription from the physician owning that pharmacy, significantly higher than 6% in other pharmacies ($p\text{-value} < 0.0001$). Indeed, 62% of customers using public physician-owned pharmacies and with a prescription from that physician cited recommendations or referrals from a health professional as the main reason for going to that pharmacy, significantly higher than the 26% of customers with prescriptions from other public physicians giving this as the main reason.

After controlling for other factors in multivariate regressions, results demonstrated that customers of public physician-owned pharmacies had 5.6 times greater odds of having a prescription from a public hospital physician, and 16.1 times greater odds of having a prescription from a pharmacy-owning public hospital physician, as compared with customers using other pharmacies ($p\text{-value} < 0.0001$ in both cases). Results for pharmacy-owning private physicians were consistent with these findings. These results thus support hypothesis 7.

Hypothesis 8: Patients referred to doctor-owned ancillary facilities will spend more on healthcare they need to.

Empirical proxy: Patients with prescriptions from pharmacy-owning physicians will spend more in pharmacies than patients with prescriptions from other physicians.

The ability of pharmacy-owning public physicians to persuade hospital patients to use their pharmacy is a concern for policymakers if it has adverse health and/or cost

implications for the patient. Whilst health consequences are beyond the scope of this research, results suggest that customers using public physician-owned pharmacies are, under certain circumstances, spending more than other pharmacy customers (Model *B1*). Multivariate regression analysis showed that customers with prescriptions from a hospital physician (pharmacy-owning or not) *and* utilising a pharmacy owned by a public physician spent more than other customers in the full sample. Further, sub-sample analysis of customers with a prescription from a public hospital illustrated that customers using a public physician-owned pharmacy spent 49.3% more ($p\text{-value}=0.005$) than those using other pharmacies, everything else being equal.

However, results also showed that customers with prescriptions from pharmacy-owning public physicians spent 37.4% less ($p\text{-value}=0.048$) than those with prescriptions from other public physicians. Cross-tabulations of expenditure by pharmacy ownership and prescription type help explain these seemingly contradictory results. Customers with prescriptions from pharmacy-owning public physicians only spent (marginally) less than those with prescriptions from other public physicians if they used pharmacies *not* owned by these public physicians (142 v 215PHP, but $p\text{-value}=0.1663$). They actually spent the same or more than those with prescriptions from other public physicians in pharmacies owned by public physicians (379 v 342PHP, difference insignificant).

This suggests hypothesis 7 should be rejected, or at least modified. This is because results show that for pharmacy customers with a hospital prescription, which pharmacy type they purchased their medicines from is more important than who gave them their prescription in determining health expenditures, everything else being equal. That is, customers using public physician-owned pharmacies spend more, but this cannot be explained by pharmacy-owning physicians giving more expensive prescriptions than other hospital physicians. It is still a concern because Models *A1* and *A2* suggested that pharmacy-owning public physicians are able to persuade patients to utilise their pharmacies.

Empirical proxy. Patients with prescriptions from pharmacy-owning physicians would spend less on medicines if generic versions were fully available within their local public hospital.

Although it is not evident that customers with prescriptions from pharmacy-owning public physicians are spending more than all other customers, comparisons of their pharmacy expenditures with simulated generic expenditures show that they (and indeed other customers) are typically spending more on prescribed medicines than they need to (Model *B2*). This is because generics are significantly cheaper and customers often purchase branded rather than generic medicines (88% purchased branded medicines across the sub-sample of patients with prescriptions from pharmacy-owning public physicians).

More precisely, for customers with prescriptions from pharmacy-owning public physicians and purchasing branded medicines, switching to generic medicines would reduce pharmaceutical expenditure to an estimated 19%-81% (and an average of 42%) of their actual expenditure. This supports hypothesis 8, although it is also likely that other pharmacy customers will make similar cost savings.

It is important to note that because data showed that prices of generic medicines in public hospitals were typically higher than in private pharmacies, cost savings will only be nearer the middle or lower part of this spectrum if public hospitals sold generic medicines at more competitive prices. Further, generic (and branded) medicine availability in public hospitals was significantly lower than in private pharmacies.

7.4.2 Limitations of analysis

A first limitation of this chapter was that data were not collected from patients that bought medicines in the hospital pharmacy, or from patients who did not buy any of the medicines that they were prescribed. Nonetheless, other data from the QIDS study showed that for 98.7% of inpatient cases younger than six, the parent/carer had

to obtain additional prescribed medicines outside of the hospital, so bias from this source is unlikely.

Secondly, districts and pharmacies were selected purposively. However, the participation rate among both pharmacies and pharmacy customers was high and there is no a priori reason to think that the results are driven by the sampling frame. Further, although there was a large sample of pharmacy customers, these were clustered into relatively few (29) pharmacies. Further, there was no analysis of a physician's decision to obtain pharmacy ownership stakes, and consequently if (and if so, how) pharmacy-owning physicians differ from other physicians.

Third, there is a possibility that some physicians with links to pharmacies were not identified. Although pharmacy screening interviews ascertained whether pharmacies had direct familial links to specific physicians, it is still possible that more informal links between pharmacies and physicians were not captured. This would mean that certain pharmacies classified as "independent" actually had physician links. This form of misclassification would tend to underestimate the actual differences between pharmacy ownership types. Still, the interviewee was asked, under the guarantee of anonymity, if they knew whether other pharmacies in the site had links to a physician, as well as to describe any kind of interactions they had with physicians. This should limit such identification problems.

Fourth, although results illustrated that pharmacy-owning public physicians were able to persuade patients to utilize their pharmacy, the research only began to explore how they are able to do this. Explanations did emerge as a by-product of the screening interviews with pharmacists working in pharmacies *not* owned by physicians. For instance, three of these pharmacists said that pharmacy-owning physicians' prescriptions did not include the generic name, listed an unusual brand, and/or a code that other pharmacies could not recognise. Another pharmacist said that if an inpatient's carer bought medicines from a pharmacy not owned by a public physician, that physician would not treat them (they are able to ascertain where the

medicine was purchased by asking the patient to show them the purchase receipt). However, these pharmacist explanations were subjective, potentially biased (since they were direct competitors of physician-owned pharmacies) and not explored using systematic qualitative interviewing techniques. Qualitative interviews of a sample of pharmacy customers would have been more appropriate. Indeed, one pharmacy customer did imply, unprompted, that the hospital physician would only treat her child if she bought the medicines from his/her pharmacy.

A fifth limitation relates to analysis of within-group variation. In particular, although the analysis showed that physician ownership of pharmacies was an important determinant of both the probability of receiving a prescription from such a physician (Model *A*) and of health expenditure (Model *B1*), it could not explain variation of results *within* the sub-group of pharmacy-owning public physicians. This is relevant because noticeable variation within this sub-group was identified. Variation in the importance they attach to non-financial incentives could explain this variation, but could not be evaluated because of a lack of data.

Finally, the analysis could not analyse the linkage between physicians owning private pharmacies and the number of prescriptions. Pharmacy-owning physicians face a stronger financial incentive to over-prescribe. Although Model *B1* showed that health expenditures were higher in public physician-owned pharmacies, it cannot show if this is explained by more prescriptions or if it is just more expensive medicines being prescribed and thus it is not possible to disentangle price and quantity effects. Potential over-prescription also implies that the cost savings in Model *B2* would have been under-estimated, since this model's simulations assume that a public physician's prescription practice would remain unchanged even if generic forms of required medicines were fully available within public hospitals.

7.4.3 Summary and conclusion

The phenomenon of public physicians in LIC and LMIC settings engaging in private sector activities is widespread (Eggleston and Bir 2006; Ferrinho, Van Lerberghe *et*

al. 2004). This research found that ownership of private pharmacies by public physicians in the Philippines led to potential conflicts of interest that were detrimental to patients in terms of higher health expenditure. In particular, the research showed that:

- Pharmacy-owning physicians are able to persuade patients to use their pharmacies;
- Individuals using these pharmacies generally spend more than others, although this is also true for those not having a prescription from the pharmacy-owning physician;
- Many individuals could save significantly if generic medicines were fully available within public hospitals.

Such findings demonstrate that physicians respond to financial incentives, in this case the incentives inherent within a physician's financial links to private pharmacies. Consequently patients too often spend more on prescribed medicines than they need to.

Chapter 8: Discussion and Policy Implications

8.1 Key findings

This thesis has explored how the incentives faced by doctors can influence the quality of healthcare a patient receives. Results were based on data from the lower-middle income country setting of the Philippines. This section brings together the main findings from the three results chapters, linking them to the overall objectives of the thesis. These findings are considered in relation to the literature on healthcare quality measures, and research evaluating the influence of incentives on the quality of health service delivery.

8.1.1 Exploring the conceptual and empirical relationship between the quantity and quality of healthcare (Objective 1)

The conceptual framework showed that supply-side incentives affect the quality of healthcare a patient receives through their impact on the amount of medical effort a doctor exerts on a patient. Thus before assessing the impact of incentives on medical effort (objectives 2 and 3), the first objective of this thesis is to explore the relationship between medical effort and the quality of care.

Effort was empirically measured in terms of a doctor's recommended treatment plan. Insufficient effort equated to when a doctor provided less than a predefined essential treatment plan; unnecessary effort was when a doctor recommended treatments that were not in this essential treatment plan. Thus effort is empirically evaluated in terms of the quantity of healthcare given.

At a general level, results showed that the relationship between the quantity and quality of healthcare is not well-represented by a simple two-dimensional plot. That is, based on doctors' responses to clinical vignettes, there is not a single 'optimal'

quantity of care that can be defined, below which care is too little and above which care is too much. Instead, paths to better quality care require doctors to provide more sufficient care and less unnecessary care simultaneously. Indeed, in 69% of vignettes, doctors gave both insufficient and unnecessary treatment. Further, in 74% of vignettes, doctors gave non-essential treatments, yet in only 5% of the vignettes did doctors provide the complete essential treatment plan.

Nevertheless, results showed that these two aspects of inappropriate care had rather different negative consequences. Moving from insufficient to sufficient care can bring large health gains for the patient without great expense. In contrast, reducing unnecessary care can lead to important cost savings, but it does not offer substantial health gains. Thus low effort is more likely to have adverse health effects than when doctors exert too much effort.

More specifically, insufficient care always had expected negative health consequences (as adjudged by a panel of physicians), and in 65% of vignettes could be life-threatening or lead to hospitalisation. Further, moving from insufficient to sufficient care was not expected to be particularly costly in terms of required health inputs (for example, better advice on homecare and low-cost medications such as oral rehydration salts). In contrast, unnecessary care was often costly (for instance, doctors recommended unnecessarily hospitalising patients 34% of the time), but was typically health neutral. Thus although there is not a single optimal quantity of care, insufficient care is more likely to have worse health consequences for the patient than unnecessary care. An important caveat is that unnecessary care often took the form of doctors recommending antibiotics (i.e. 47% of the time). Although adjudged by physicians to be mostly health neutral on a case-by-case basis, overuse of antibiotics is a public health concern because it can cause higher antibiotic resistance to the population as a whole. Further, unnecessary hospitalisation also increases the risk of individuals acquiring nosocomial infections.

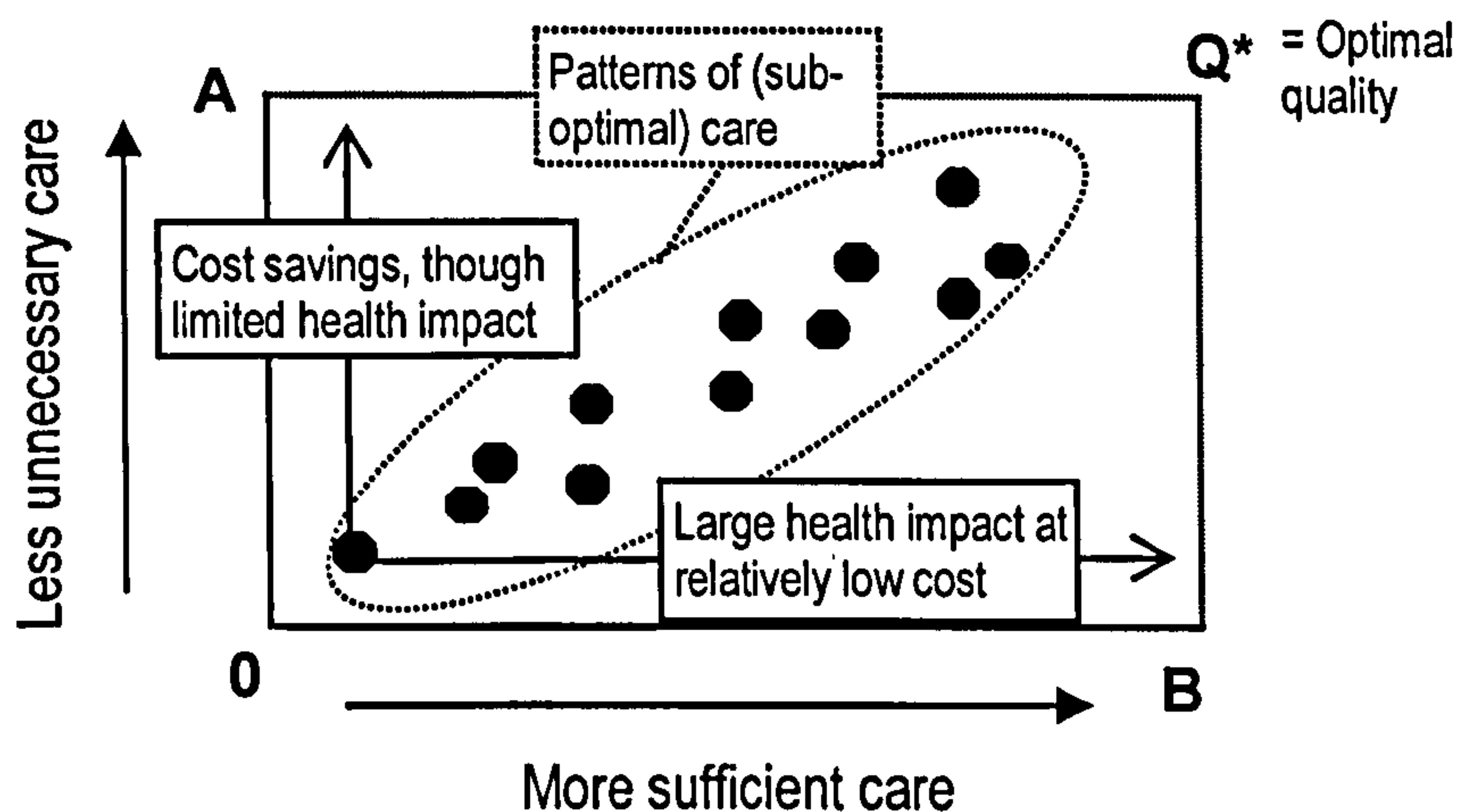
Results also indicated that doctors can be grouped in terms of how far they are likely to be from providing optimal care. Doctors who provided the least sufficient care were also the most likely to give harmful and costly unnecessary care. Moreover, these doctors were more likely to be those treating diarrhoea patients than those treating pneumonia patients, though there were no such consistent differences between public and private doctors. This may reflect unnecessary care having more likelihood of being harmful for diarrhoea than for pneumonia cases.

In summary, results show that:

- The relationship between the quality and quantity of care cannot be collapsed to a question of whether doctors provide too little *or* too much care, since doctors typically do both simultaneously.
- Insufficient care (too little effort) is more likely to have adverse health effects than unnecessary care (too much effort).
- Unnecessary care remains a concern since it can be costly for the patient and society overall, and because it often involves unnecessary use of antibiotics.
- Doctors that provide the least sufficient care are the most likely to give harmful and costly unnecessary care.
- These doctors are also more likely to be treating diarrhoea rather than pneumonia patients.

Figure 8.1, adapted from Figure 5.1, helps to illustrate these empirical insights.

Figure 8.1: The quality-quantity relationship & pathways to better quality care



These findings on the relationship between quality and quantity of care add to the literature in the sense that existing research has typically evaluated the extent of insufficient care *or* unnecessary care, but not both at the same time. For instance, in other studies that have used vignettes, a doctor's technical quality of care is assessed by analysing whether s/he has provided a comprehensive set of actions needed to improve a patient's health (see, for example, Peabody, Luck, Glassman *et al.* 2004; Das and Hammer 2005a), and if not, which actions they did not provide. But no distinction is made in these studies between a doctor failing to recommend a needed treatment (or other action), and a doctor recommending an unnecessary treatment. Both are simply classified as incorrect.

In this sense, most existing studies using vignettes to measure quality of care can be understood as focusing on the extent of insufficient care, with no direct analysis of unnecessary care. Indeed, most studies measuring healthcare quality can be understood in the same way. Structural quality measures, evaluating whether health providers have key inputs needed to provide adequate quality care, can (at best) assess whether doctors are likely to be constrained in their attempts to provide comprehensive care (e.g. Barber and Gertler 2002). However, they provide no information on the potential for over-provision. Studies using other process quality

measures – such as chart abstraction (e.g. Iezzoni 1997a), direct observation (e.g. Das *et al.* 2008) and standardised patient approaches (e.g. Beullens *et al.* 1997) – can also be interpreted in the same way. That is, they compare a doctor's healthcare provision against a checklist of required actions, with the focus being on which aspects of this checklist the doctor failed to complete. Outcome measures, assessing quality through the impact of healthcare on a patient's health, only provide an overall assessment of quality of care. That is, they cannot easily separate out the impact (positive or negative) of individual aspects of a doctor's treatment plan on a patient's health, and consequently cannot identify when doctors are providing too little and/or too much care.

In contrast, the literatures on health provider efficiency and supplier-induced demand assess unnecessary care but not insufficient care. The sole focus of the supplier-induced demand literature is on whether, and if so how, doctors can influence patients to utilise more healthcare than is clinically necessary (McGuire 2000). The efficiency literature has shown that hospitals (as a whole) have some costs that are due to waste or poor decision-making. But most of these efficiency studies implicitly assume adequate quality (Hussey *et al.* 2009). That is, they assume healthcare in these hospitals is sufficient to successfully treat patients. Some efficiency studies do account for quality, and consequently the possibility of insufficient care (McKay and Deily 2008; Mutter *et al.* 2008; Zuckerman *et al.* 1994). Nevertheless, these studies concentrate on identifying when quantity of care can be reduced without negatively impacting upon healthcare quality, rather than on quality directly.

8.1.2 Analysing the impact of supply-side incentives on the quantity and quality of healthcare received by public hospital inpatients (Objective 2)

In the conceptual framework, doctors were hypothesised to be influenced by a variety of financial and non-financial incentives, with consequent effects on the healthcare a patient receives. This second objective of the thesis tested these hypotheses through analysis of the healthcare given by public hospital doctors to

under-five children diagnosed with diarrhoea or pneumonia and admitted as inpatients.

Results found that public hospital inpatients with equal health need are not always treated equally. In particular, doctors responded to certain aspects of the incentive structure, with the following factors all influencing the amount of medical effort doctors exerted on patients:

- The daily charge a patient paid for room and board;
- Whether a patient had (and used) health insurance;
- External monitoring of a hospital’s structural quality;
- Bonus payments to doctors;
- Household income of the patient.

However, doctor responses to supply-side incentives were never pervasive across all model variants. This was especially marked for bonus payments to doctors and a patient’s household income. Moreover, patient perceptions of medical effort found much less evidence of doctor responses to incentives than when the two other empirical proxies of effort were used (whether the patient received the standard inpatient clinical package; and whether the patient received medication by injection rather than intravenously). Doctors were also more likely to respond to incentives for pneumonia rather than diarrhoea inpatients. Furthermore, non-financial factors, and increased breadth and depth of insurance coverage in selected districts, had little or no impact upon medical effort. These mixed results may be due to the limited power inherent in financial incentives faced by public doctors in the Philippines, in addition to statistical and more substantive limitations of the empirical models (as discussed in chapter 6). Mixed results may also simply reflect the fact that doctors are also motivated by professionalism and concern for a patient’s well-being.

Tables 8.1a and 8.1b highlight this variation in results across empirical specifications for each of the relevant thesis hypotheses.

Table 8.1a Research hypotheses 1-6, and significance of empirical findings

Evidence in support of hypotheses, from 3 empirical measures of medical effort*:		
Hypothesis	Clinical packages [CP]	Patient perceptions [PP] Medication administration type [MAT]
1. Performance-based payments encourage a more appropriate effort level if they are well correlated with e*.	Empirical proxy: Bonus payments to hospital (QIDS 'bonus' intervention) No evidence.	Minimal** evidence. Evidence for pneumonia and diarrhoea cases.
2. More effort will be exerted on patients that a doctor receives a higher financial reward from.	Empirical proxy: Daily room and board charge Evidence for pneumonia but not diarrhoea cases.	Minimal** evidence. Evidence for pneumonia but not diarrhoea cases.
	Empirical proxy: Increased depth & breadth of insurance coverage in district (QIDS 'access' intervention) No evidence.	No evidence.
3. More effort will be exerted on patients from whom a doctor receives a higher non-financial reward.	Empirical proxy: Household income of patient No evidence.	Evidence for pneumonia but not diarrhoea cases.
4. More effort will be exerted on patients who are better able to advocate for more care.	Empirical proxy: Education of patient's mother No evidence.	No evidence.
5. Doctors that are effectively monitored will provide a more appropriate effort level.	Empirical proxy: External monitoring of hospital Evidence for pneumonia and diarrhoea cases.	Evidence for pneumonia but not diarrhoea cases.
	Empirical proxy: Internal monitoring within hospital No evidence.	No evidence.
6. More effort will be exerted on the insured than the non-insured (independent of reward a doctor receives from a patient)	Empirical proxy: Patient has (and uses) PHIC health insurance Evidence for pneumonia and diarrhoea cases.	No evidence. Evidence for pneumonia but not diarrhoea cases.

*CP: whether or not the patient received at least a standard inpatient clinical package; PP: patient perceptions on the sufficiency of care; MAT: whether the patient received medication by injection rather than intravenously. / **There was statistical support of these hypotheses in only 1 of the 4 dependent variable specifications.

Table 8.1b Research hypotheses 1-6, and strength of statistically significant (p-value<0.1) findings

Hypothesis	Evidence in support of hypotheses: statistically significant findings [empirical measure of medical effort: CP, PP or MAT]
Hypothesis 1	<ul style="list-style-type: none">– Patients had 4.5 times higher odds of being satisfied with the doctor doing “everything needed to provide complete medical care” if the doctor received QIDS ‘bonus’ payments (p-value=0.052) [PP].– Doctors receiving QIDS ‘bonus’ payments were 51% (pneumonia) & 92% (diarrhoea) less likely to administer medication by injection rather than intravenously (p-value=0.019) [MAT].
Hypothesis 2	<p>A 100PHP (\$1.9 USD) increase in the daily room charge:</p> <ul style="list-style-type: none">– Increased the odds of a child receiving the standard inpatient package by 14% for pneumonia patients (p-value=0.09) [CP].– Increased the odds of a child’s carer being satisfied that health providers “check everything when treating and examining my child” (p-value=0.037) [PP].– Decreased the odds of receiving medication by injection rather than intravenously by 14% for pneumonia patients (p-value=0.02) [MAT].
Hypothesis 3	<ul style="list-style-type: none">– For pneumonia patients, patients from the bottom income quintile were 28-35% more likely to receive medication by injection rather than intravenously, as compared with children from the other four income quintiles [MAT].
Hypothesis 4	(No statistically significant findings in support of hypothesis)
Hypothesis 5	<ul style="list-style-type: none">– Patients in externally monitored hospitals had 1.9 (pneumonia, p-value=0.04) & 2.3 (diarrhoea, p-value=0.023) times higher odds of receiving the standard inpatient package [CP].– For pneumonia patients, doctors working in externally monitored hospitals were 29% less likely to administer medication by injection rather than intravenously (p-value=0.043) [MAT].
Hypothesis 6	<ul style="list-style-type: none">– Patients who have and use PHIC insurance had 2.1(pneumonia, p-value<0.0001) & 2.5(diarrhoea, p-value<0.0001) times higher odds of receiving the standard inpatient package [CP]– For pneumonia patients, patients who have and use PHIC insurance were 40% more likely to receive medication by injection rather than intravenously (p-value=0.011) [MAT].

CP = clinical packages; PP = patient perceptions; MAT = medication administration type

Notwithstanding this variation in findings across hypotheses and empirical specifications, these results suggest that doctors respond to incentives as well as health need when treating a patient. This is consistent with insights from a broad literature, which has shown how the incentive structure can influence a doctor's behaviour in a variety of settings, and consequently the healthcare a patient receives. Much of this literature has focused on how doctors facing different incentives provide different healthcare. This is the case with the literature on provider reimbursement mechanisms (for example, Gosden *et al.* 2001; Petersen *et al.* 2006; Yip and Eggleston 2001), and in comparisons of doctors working in different health facility ownership types (such as Das and Hammer 2004, 2005a; Leonard and Masatu 2007). The results presented here complement this literature by showing how the supply-side incentives inherent in treating different patients can lead to unequal treatment across patients, an area where there has been less quantitative research in LIC/LMIC settings (McPake *et al.* 2004 and Sodemann *et al.* 2006 being notable exceptions).

These results also contribute to the literature by bringing together a variety of financial and non-financial supply-side incentives into one analysis. In doing so, it allows a comparison of the relative impacts of different aspects of the incentive structure on health service delivery. These aspects are broadly characteristic of many LIC/LMIC public hospital systems, where hospital doctors often operate within the context of a mix of financing sources and monitoring activities. Research outside the health sector has analysed the relative importance of financial and non-financial factors in worker motivation, including a more profound analysis than this research on the potential for conflicts between these factors (Fehr and Falk 2002; Frey and Jegen 2001). But such research has rarely been applied to the health sector (a recent exception being Franco *et al.* 2004), and even when it has, focuses more on how incentives affect worker motivation than the actual healthcare a patient receives.

This research thus contributes to the literature by showing how different supply-side incentives affect the amount of medical effort doctors exert on different patients. But making inferences on the impact of incentives on the technical quality of care requires the

normative judgement that more medical effort results in better quality care. For two proxies of medical effort (CP and PP), greater effort is related to more sufficient, and in this sense better quality, care. This is consistent with findings from chapter 5 that, while cautioning against a simple relationship between the quality and quantity of care, showed that doctors providing the least sufficient care were the furthest away from providing optimal quality care. However, this assumes that effort proxies are accurate measures of the actual sufficiency of care, and data limitations mean this cannot be assured (as discussed in chapter 6). In the third medical effort proxy (MAT), more effort is related to minimising patient discomfort, and in this sense better quality care. But there may be cases when patient discomfort is related to illness severity factors (that are not captured in these regressions) rather than to the doctor's medical effort.

In summary, results showed that doctors exerted more effort on some patients over others because of the incentives they face, with potential repercussions for the technical quality of care a patient receives. At the same time, responses to supply-side incentives were mixed. This implies that, amongst other factors, a doctor's concern for the patient's well-being moderates a physician's response to incentives. Nevertheless, doctors' responses to incentives lead to patients with equal health need being treated unequally.

8.1.3 Assessing if doctors unduly influence patients' use and expenditure in ancillary health facilities with which they have financial links (Objective 3)

The conceptual framework showed that doctors with links to ancillary facilities have a financial incentive to refer patients to such facilities, and to encourage referred patients to spend more on healthcare than is needed. These theoretical insights were evaluated by investigating the behaviour of doctors who owned (or had familial links with) private pharmacies. Results indicated that doctors did indeed respond to this financial incentive, showing that:

- Pharmacy-owning doctors appear to persuade patients to use their pharmacy in preference to alternative pharmacies.

That is, after controlling for other factors, customers using public physician-owned pharmacies had 5.4 times greater odds of having a prescription from a public hospital physician, as compared with customers using other pharmacies. Alternative model specifications, which assessed the odds of a customer having a prescription from a pharmacy-owning public or private physician, produced even more pronounced results. Customers using public physician-owned pharmacies had 16.6 times greater odds of having a prescription from a pharmacy-owning public hospital physician; customers using private physician-owned pharmacies had 82.7 times greater odds of having a prescription from a pharmacy-owning private physician. These extremely high odds ratios are explained by the rarity of a customer having a prescription from a pharmacy-owning physician and not using that physician's pharmacy. Indeed, amongst customers with a prescription from a pharmacy-owning public physician and using that pharmacy, 61% cited the influence of a health professional as the main reason why they went to that pharmacy. The respective figure for customers with prescriptions from other public physicians was 26%, with the difference between these values statistically significant.

– Customers using public physician-owned pharmacies spent 49% more than those using other pharmacies (this analysis was based on the sub-sample of customers with a prescription from a public hospital).

However, in determining expenditures, the type of pharmacy customers purchased their medicines from was more important than who gave them their prescription. That is, public hospital doctors who owned pharmacies did not prescribe more expensive medicines than other hospital doctors. Nonetheless, physician ownership of pharmacies remains a concern because of the finding that pharmacy-owning physicians can persuade patients to utilize their pharmacies.

– Many customers with prescriptions from a pharmacy-owning public physician purchased branded medicines. These customers could make substantial savings if they switched to generic versions.

More precisely, for the 88% of these customers who purchased branded medicines, pharmaceutical expenditure could be reduced by an average of 58%, saving 194PHP

(\$4.2 USD) if they purchased generics instead. This finding implies that there are potentially significant savings for both individuals paying out-of-pocket and third-party payers. It should be noted, though, that for other pharmacy customers, a similar proportion purchased branded medicines. These customers are likely to make similar cost savings, with low generic usage a wider policy concern.

Table 8.2 relates these findings to the relevant thesis hypotheses.

Table 8.2 Research hypotheses 7-8, and strength of statistically significant (p -value<0.1) findings

Hypothesis	Evidence in support of hypotheses: statistically significant findings	
7. Doctors owning (or having financial links with) external ancillary health facilities will refer patients to such facilities.	Pharmacy use.	– Customers using public physician-owned pharmacies had 5.4 greater odds of having a prescription from a public hospital physician (p -value<0.0001).
		– Customers using public physician-owned pharmacies had 16.6 greater odds of having a prescription from a pharmacy-owning public hospital physician (p -value<0.0001).
		– Customers using private physician-owned pharmacies had 82.7 greater odds of having a prescription from a pharmacy-owning private physician (p -value<0.0001).
8. Patients referred to doctor-owned ancillary facilities will spend more on healthcare than they need to.	Observed pharmaceutical expenditures (for sub-sample of customers with a prescription from a public hospital).	
	– Customers using public physician-owned pharmacies spent 49% more than those using other pharmacies (p -value=0.005).	
	Simulated pharmaceutical expenditures (for sub-sample of customers with prescription from pharmacy-owning public physician).	
	– For the 68% of these customers who purchased only branded medicines, pharmaceutical expenditure could be reduced by an average of 58%, saving 212PHP (\$4.6 USD) if they purchased generics instead.	
	For the 20% of these customers purchasing both branded and generic medicines, their expenditure would be reduced by 49% on average, saving 144PHP (\$3.1 USD).	

These findings add to the literature by demonstrating the impact financial incentives inherent in physician pharmacy ownership have on pharmacy customers, a phenomenon that has rarely been studied in LIC or LMIC settings. Results are consistent with other studies that analysed financial links between doctors and health facilities in higher-middle income or high-income country settings, which have shown that utilisation, expenditure and profits of various ancillary facilities were higher if these facilities had links with physicians (see, for example, Chou *et al.* 2003; Lynk and Longley 2002). Results also show that the patient consequences of doctors owning pharmacies are similar to when doctors dispense drugs, in terms of higher health expenditures (Trap 2001).

More generally, these findings, as with those related to the second thesis objective, provide further evidence that a patient's healthcare can be adversely affected because of a doctor's response to incentives. For physician pharmacy ownership, this adverse effect is in terms of unnecessary care: patients are spending more than they need to, though data constraints meant that quality implications were not analysed. Still, findings from the first objective tentatively suggest that such unnecessary pharmaceutical expenditure, though less harmful to patients than insufficient care, is likely to result in patients buying antibiotics that are not needed. Note this assumes part of the unnecessary expenditure reflects customers buying too many (in addition to higher price) drugs, yet the data cannot disentangle quantity from price effects.

Whilst the effects on the technical quality of care can therefore only be inferred, what is unequivocal is that physician pharmacy ownership creates financial incentives that directly affect patients' drug purchasing decisions. This constitutes a clear conflict of interest that can be detrimental to patients. In particular, these supply-side incentives influence where a patient purchases prescribed medicine, and can lead to patients spending more on medicines than needed.

8.2 Methodological strengths and limitations

Limitations specific to each set of results were discussed at the end of the three results chapters (chapters 5-7). This section focuses instead on the broader methodological strengths and limitations of the thesis.

8.2.1 Reflections on the conceptual framework and its links to theory

The conceptual framework, through its adaptation of the principal-agent model, provides insights into the theoretical effects of supply-side incentives on the quality of health service delivery, and develops hypotheses that can be empirically tested. The rationale for its specific design, including the decision to adapt the principal-agent model, was explained in chapter 3.

Existing studies have already analysed extensions of the basic principal-agent model as applied to healthcare, particularly in relation to asymmetric information, but also when there are multiple principals, multiple agents and when non-financial factors enter a health worker's utility function (as discussed in section 2.4.1 of the literature review). The application of the principal-agent model in this thesis contributes to the literature by first showing how supply-side incentives affect the quality of health service delivery through their impact on the medical effort exerted by health workers. Then, recognising the importance of non-financial factors and other extensions to the basic principal-agent model, it explores the implications for equity in healthcare when the doctor-patient relationship varies across patients and across facilities, and analyses how doctor ownership of ancillary facilities can be expected to affect their referral behaviour.

Nonetheless, the conceptual framework is limited in what it is able to analyse. This reflects the choice of the principal-agent model as the theoretical basis for the conceptual framework. It also is a consequence of focusing on the doctor-patient interaction within the principal-agent model application of the conceptual framework.

A first limitation of this use of the principal-agent model is that there is no analysis of how institutions affect the overall incentive structure. Yet the new institutional economics literature shows that the governance structure in which a doctor operates affects the intensity of incentives (see, for example, Leonard 2002). This could, for instance, provide further insights into why there are differential responses to specific incentives by health providers across different districts. However, this should not present a major limitation here, given that the empirical chapters predominantly analyse doctors working within similar governance structures. Still, more detailed district case studies may have found subtle differences in the institutional environments across districts, such as variation in the level of autonomy afforded to public hospitals by district leaders.

A second limitation is that within the principal-agent application developed in the conceptual framework, there is only limited analysis of how group dynamics can affect an individual doctor's response to incentives. The conceptual framework does recognise that incentives faced at higher levels in a health system will have less effect on individual doctors if these doctors face different, conflicting incentives (Harris 1977). However, there is no analysis of an individual doctor's interaction with other health workers.

At a more fundamental level, the conceptual framework is limited to addressing *how* doctors are expected to respond to incentives (and consequently the implications for patients). But it does not directly analyse the more intrinsic reasons *why* doctors respond to incentives. This is because although the principal-agent model is established as the predominant economic theory used to study how one group or individual (the principal) can affect the behaviour of another group or individual (the agent) through incentives (Dixit 2002; Laffont and Martimort 2002; Prendergast 1999), principal-agent models do not analyse the underlying determinants of worker motivation. That is, in principal-agent theory the reasons why individuals respond to incentives are exogenously determined, being based on different assumptions about what motivates workers. To better answer the question of why, as opposed to how,

individuals respond to incentives, requires analysis of the determinants of worker motivation (Franco, Bennett *et al.* 2002 offer a recent example based on this alternative conceptual strategy). Still, whilst the conceptual framework is, because of its principal-agent approach, necessarily limited to analysing how doctors respond to incentives, this analysis was informed by theories of worker motivation that address the reasons why individuals respond to these incentives.

8.2.2 Reflections on the empirical approach

The strengths and limitations of the empirical approach were shaped by the methods of data collection. Both primary and secondary datasets were based on survey or vignette data. This meant the data were predominantly quantitative in nature, and were derived from recalled or hypothetical events.

Whilst these data collection methods were effective in demonstrating how supply-side incentives affected the quality of health service delivery, alternative approaches could also have been chosen. For example, qualitative techniques may have been better in understanding why doctors responded differently to the same incentive. However, qualitative methods are less useful in demonstrating the actual impact of incentives on health service delivery.

A second alternative would have been direct observation of the doctor-patient interaction. This may have more accurately described the services received in hospitals than patient exit surveys, including a quantitative assessment of unnecessary as well as insufficient care. It could also have illustrated how pharmacy-owning doctors persuaded patients to utilize their pharmacies. Such direct observation methods, though, are likely to suffer from the “Hawthorne effect”, at least when the observation is over a short time period (see, for example, Leonard and Masatu 2006), and are also comparatively expensive (as discussed in section 2.4 of the literature review).

On a more practical note, permission could not be obtained for either of these two alternative methods in the QIDS districts. This was because the QIDS research team were concerned that any direct interaction with health workers in the QIDS study sites could potentially bias the QIDS policy experiment (which was in progress at the time of research).

For the parts of the thesis utilizing secondary data, an immediate and inevitable limitation is that the dataset was constructed to address the aims of the QIDS study, rather than the research objectives of this thesis. This meant certain variables were imperfect proxies for provider or patient characteristics, and other potentially interesting characteristics could not be included within empirical model specifications (discussed in greater detail in chapters 5 and 6). However, the secondary dataset was designed to analyse a policy experiment that was relevant to the overall research aim of this thesis. Further, utilizing secondary data meant that a large-scale dataset could be accessed, which had a wealth of information and thus the potential for substantial statistical power.

Conversely, for the parts of the thesis using primary data, the general strength was that the dataset was explicitly designed to answer one of the thesis' research objectives. However, the primary dataset was considerably more limited in scope than the secondary dataset (discussed further in chapter 7).

For both primary and secondary data, results are also limited by the fact that they are cross-sectional rather than time-series analyses. This implies that regression results are ultimately limited to showing *associations* between explanatory and dependent variables, as opposed to the stronger statement that a change in an explanatory variable *causes* a change in a dependent variable. Stronger statements might require experimental designs and more comprehensive controls for confounding.

More generally, the empirical approach involved three separate analyses, each of which used different data and had different empirical model specifications. This was

borne out of the opportunity to utilise more than one data source, and had the advantage of providing empirical insights on the research aim and objectives of the thesis in a variety of ways. However, it also made it a challenge to ensure that the core research aim of this thesis – to analyse how the incentives faced by a doctor influences the quality of healthcare – is answered in a coherent, non-fragmented manner. Perhaps the main challenge was to link empirical analysis of the relationship between the technical quality and quantity of care (chapter 5) with subsequent results chapters (chapters 6 and 7) into an overall perspective on the effect of supply-side incentives. These latter two chapters focused on how incentives affected the quality of care through their effect on (empirical measures of) medical effort, with their quality implications largely reliant on the first empirical chapter's analysis of the relationship between medical effort and quality. But although these analyses were conceptually linked through the conceptual framework, they remained separate analyses.

8.2.3 Generalisability of results

The study sites were broadly representative of the Philippines' level of economic development and health system structure, suggesting that findings can be generalised nationwide. In particular, results of this thesis were based on data collection that spanned a large area of the Philippines: the 30 study districts had a combined population of approximately 2.2 million, and were sampled from 11 provinces in which an estimated 12.1 million people live (source:

<http://www.nscb.gov.ph/activestats/psgc/listprov.asp>). These study sites had per capita incomes and poverty incidence rates that were similar to the national average, and thus were broadly representative of the Philippines as a whole. They were, though, less representative of the National Capital Region, which is considerably wealthier and has a much lower poverty incidence than the rest of the country. In terms of the health system, the study districts were comparable to other districts in the Philippines, though with less private sector involvement in the provision of care than in the country's largest cities. That is, study sites were characterised by a main

public hospital within the district, typically complemented by a mixture of lower-level public and private health facilities.

However, empirical analysis only analysed the technical quality and response to incentives of doctors working in certain facility types, namely those working in primary- or secondary-level public hospitals, or in private clinics. Applicability of results to doctors working in other facility types, such as private hospitals and tertiary-level public hospitals, may be limited for a number of reasons. First, the relationship between quality and quantity may be different for doctors working in higher-level facilities (public or private). For example, because these doctors have greater access to medicines and other health inputs, they may be less likely to provide insufficient care, but more likely to recommend non-essential treatments which have only marginal health benefits. Second, for doctors working in other facility types, the intensity of specific incentives faced may vary because these facilities have different governance structures. For instance, the strength of the observed positive relationship between health insurance membership and the quantity of care received may have been greater in private for-profit hospitals than sampled public hospitals, because of likely differences in the intensity of this financial incentive between these two hospital types.

Nevertheless, this focus of the analysis on doctors working in certain facility types is unlikely to change the core insights on the relationship between the quality and quantity of care, and how supply-side incentives can impact upon the quality of care a patient receives. In the most general of terms, both public and private doctors are still expected to respond to financial incentives, with important implications for the quality of care a patient receives. But it does suggest the need to be cautious in generalising the precise quantitative findings of this thesis to doctors working in other facility types.

It is contended that the same point about generalising the core insights but not the precise findings holds true in terms of applicability of results to other low and lower-

middle income countries. Indeed, the empirical work was based on testing insights and hypotheses from a conceptual framework derived from economic theory. That is, the conceptual framework was able to show there are theoretical mechanisms at work, and therefore empirical results are likely to be relevant in settings different from the thesis study area.

Further, the literature review provides numerous examples of doctors responding to incentives in other low-middle income settings, with consequent impacts on the quality of healthcare. In addition, chapter 4 showed that the Philippines has comparable socioeconomic, health profile and health system characteristics to other countries at a similar level of economic development. However, the literature review also stressed that the exact response of doctors to different incentives will depend on the underlying determinants of worker motivation, and the institutional environment within which a doctor works. These are likely to vary across countries because of different social and cultural factors, as well as different laws and regulations of the health system.

8.3 Policy implications

This section addresses the fourth and final objective of the thesis, namely to use the empirical results to inform discussion of incentive-related health policy reforms.

8.3.1 Supply-side incentives and their broad implications for health policy

In the most general terms, results from this thesis demonstrate the need for policymakers to understand better how the incentive structure influences the behaviour of health professionals. These incentives relate not only to hospital-based care, but also the wider context within which doctors operate. In particular, results revealed that supply-side incentives and monitoring were shown to be associated with doctors exerting more effort on certain patients, and to explain variation in healthcare delivery across doctors. Incentives were also associated with doctors encouraging patients to spend more on medicines than was needed.

Policies designed to alter this incentive structure can therefore lead to doctors (and other health professionals) providing better quality care to all patients. Further, a clearer understanding of the incentive structure can help policymakers anticipate the perverse as well as desirable effects of a variety of health system policy reforms.

At the same time, there are limits to what policies aimed at reforming the incentive structure can achieve. It was shown in this thesis that supply-side incentives affect the amount of effort doctors exert, and through their effect on effort, the quality of healthcare patients receive. But results also showed that the relationship between effort and quality is complex. Further, the incentives doctors are confronted with have no direct effect on a doctor's clinical skill or the availability of essential health inputs, both of which also impact upon medical effort and ultimately the quality of healthcare. Indeed, clinical skill may be more pertinent in the case of more complex cases than the relatively common pneumonia and diarrhoea cases analysed in this thesis. Thus supply-side incentives, whilst important, need to be placed within the broader context of reforms that are designed to improve the quality of care.

8.3.2 Implications for specific health policy reforms

Incentives and public hospital care

The following policy suggestions, though focusing on public hospital care, also briefly incorporate implications for private health facilities and public primary health centres.

PHIC reimbursement

If PHIC shifted from the current fee-for-service payment to hospitals to a prospective payment method, such as capitation, the incentive for doctors to exert more effort on the insured as compared with the non-insured would be removed²⁰. This is also relevant for private hospitals accredited by PHIC. The literature on provider payments suggests such a policy would have the additional benefit of helping PHIC to contain healthcare costs.

However, moving to a prospective payment method creates its own perverse incentives, notably to provide lower quality (insufficient) care and discriminate against patients who are costly to treat (patient ‘cream-skimming’). Thus movement to a prospective payment system would require supplementary measures (such as quality-related bonuses) to encourage better quality (more sufficient) care, as well as adjustments for case severity to avoid patient cream-skimming.

Patient charges

There are two main solutions to remove the incentive for doctors to exert more effort on patients from whom they receive a higher financial reward. Whether these policy options, though, are preferable to the status quo of price discrimination in favour of the poor, depends on the relative weight policymakers place on ensuring public hospital patients are treated equally versus the costs of these solutions.

²⁰ In the longer term, universal population coverage via PHIC would automatically remove this incentive, since everyone would be insured. But the Philippines are still quite far from achieving universal coverage.

A first option is for policymakers to simply *eliminate* all patient charges for room and board, consultations, medicines and diagnostic procedures. This implies moving from the fee-for-service payment inherent in patient charges to a financing system based on prepayment. In the medium to long term, such a policy could be financed through, for example, extended PHIC population coverage or increased contributions from general government finances. But in the shorter term, raising sufficient funds for such a policy may not be feasible, given the costs associated with hospital-based care.

Alternatively, policymakers could *equalise* the payments made on behalf of patients. This does not have to mean poor and vulnerable patients should pay the same as others, since this would be likely to cause such patients financial access difficulties. Instead, the cost of patient charges for the poor and vulnerable could be paid for by third parties. Examples of such demand-based financing include vouchers, equity funds and subsidised health insurance. Such a policy is financially more feasible than eliminating patient charges in hospitals, although it can have higher associated administrative costs.

It is interesting to note that private health facilities in the Philippines can also have differential charges across patients. Consequently, they may face similar incentives to treat patients differently according to the amount paid. However, equity issues are less of a concern here, because the poor rarely use such facilities (as shown, for example, in table 4.3). Further, the elimination of patient charges in private facilities is unrealistic; and even demand-side financing mechanisms are likely to be prohibitively costly because of the higher charges in private facilities. In contrast, public primary health centres are unlikely to face such equity issues, since patients are not charged in these facilities.

Quality-based bonus payments

Although this thesis was not a direct evaluation of the QIDS quality-based bonus payments²¹, results nevertheless suggest that policymakers should consider the wider use of such bonus payments. This may be particularly valuable if combined with moves from fee-for-service to prospective reimbursement by PHIC.

Quality-based bonus payments could also be extended to doctors working in other types of health facilities. However, results in this thesis showed that such payments were only effective in increasing the effort exerted on patients in some circumstances.

Hospital autonomy; external monitoring

Results related to the effects of PHIC reimbursement and patient charges also imply that increased autonomy of hospitals could lead to equity concerns within such hospitals. Indeed, studies in other LIC and LMIC settings stress the financial accessibility problems associated with public hospital autonomy reforms for poor and vulnerable population groups (see for instance Bossert *et al.* 1997 and Ssengooba *et al.* 2002). These equity concerns would need to be balanced against the expected benefits of hospital autonomy (as discussed, for example, by Jakab *et al.* 2002).

External monitoring may counteract these potentially adverse effects, whatever degree of autonomy hospitals have. Indeed, results from this thesis suggest external monitoring in the form of ‘Sentrong Sigla’ accreditation (which assesses and monitors a hospital’s structural quality) was associated with doctors exerting more effort on patients. However, results elsewhere have shown that Sentrong Sigla was, in its early years, not effective in improving quality at the primary health care level, and was actually counterproductive for preventive activities (Catacutan 2006). Thus although this research suggests Sentrong Sigla can have beneficial effects, a detailed examination of the programme – rather than a simple comparison of accredited

²¹ This topic is being researched by the QIDS team, and is ongoing.

versus non-accredited hospitals in this thesis – is first warranted before it is expanded to more public hospitals and to other types of health facilities.

There are other ways in which hospitals can be externally monitored. Quimbo *et al.* 2008 demonstrate the positive role PHIC can play in monitoring hospital quality. The Inter-Local Health Zones, established since 1999 in certain parts of the country to improve coordination between facilities, could also undertake monitoring activities (Department of Health 2005).

Decentralisation offers further monitoring alternatives, not only by LGUs directly, but also through an associated increase in citizen participation in the health sector (Bossert and Beauvais 2002).

Incentives beyond the health facility in which a doctor works

This section analyses the example of physician ownership of private pharmacies, but (certain aspects of it) are likely to be applicable to ownership of all ancillary health facilities.

Banning physician ownership of pharmacies

At the one extreme, banning physicians from owning pharmacies would remove the perverse financial incentives associated with pharmacy ownership. However, such a policy is likely to be difficult to enforce, particularly for private physicians.

Moreover, physicians might still maintain financial links with pharmacies without actually owning them, particularly if the underlying issue of low physician salaries is not addressed. Related experiences from South Korea (Kim and Prah Ruger 2008) and Taiwan (Chou *et al.* 2003) on dispensing doctors suggest that such a policy cannot succeed in isolation.

Better availability of generic medicines

Another policy option is to improve the availability of generic medicines in public hospitals. This could produce significant savings for patients and third-party payers,

and also offer revenue opportunities for hospitals. It may also improve adherence, since the purchase is less costly and in a more convenient location for public hospital patients. However, for such a policy to be successful would require significant reform of public hospitals' drug procurement process, since hospitals in the study sites reported regular stock shortages.

Better generic medicine availability within public hospitals would have the additional benefit of putting pressure on outside pharmacies to carry generic medicines and to offer medications at competitive prices. However, as this study indicates, there would also need to be adequate monitoring of prescribing practices since there is no guarantee that pharmacy-owning public physicians would not continue to try and persuade patients to use their pharmacies. Physicians could do this, for instance, by not prescribing stocked medicines, and instead prescribing alternatives that were only available in their pharmacy.

Policymakers might also focus on ensuring private pharmacies stock generic versions of essential medicines (already the law). However, if pharmacy customers regularly demanded generics, private for-profit pharmacies would more readily supply them.

Assuring the quality and use of generics

This lack of demand for generic medicines implies a more general problem: customers may perceive generics to be of inferior quality to branded medicines, and/or physicians recommend branded products. Indeed, anecdotal evidence from this study suggests that prescriptions often exclude the medicine's generic name, even though this is in conflict with Philippine law (Republic Act No.6675). Such behaviour may reflect links between physicians and pharmaceutical manufacturing companies, with doctors financially benefiting from stocking these companies' brands (Wazana 2000).

Whilst some research has highlighted concerns on the comparability, and particularly bioequivalence, of generics with branded versions (Meredith 2003), experience from high-income countries shows that good manufacturing practice has been successful in ensuring equivalent quality of generics (see, for example, King and Kanavos 2002).

Thus for generics to be more widely used, there needs to be better monitoring of physicians' prescriptions, and, more generally, any concerns about the quality of generics needs to be assuaged. PHIC could regulate physicians' prescribing practices, given their experience in evaluating physician claims, and since they have the incentive of significant cost savings to do so. However, for this to cover a large proportion of prescriptions, PHIC reimbursement would need to be expanded to cover outpatient prescription medicines. Expansion of "Botika ng Barangays", community-run pharmacies that stock quality-assured essential generic medicines at low prices, offers an additional way of improving the quality of generics (Department of Health 2005).

Addressing low public sector salaries

Finally, it should be remembered that public physicians' salaries are typically low, relative to what they could earn elsewhere. Policymakers must recognise this, since public physician ownership of private pharmacies, and the associated perverse financial incentives that emerge, are likely to be driven by the need to cope with low public sector wages. However, whilst revision of public salary structures would reduce the need for additional income, it does not remove the perverse incentives that emerge from physician ownership of pharmacies – as demonstrated by the experience of private physicians owning pharmacies.

8.4 Areas for future research

8.4.1 Assessing the impact of different governance structures

This thesis only analysed a limited range of governance structures. Yet insights from the new institutional economics literature suggest that health providers' responses to incentives depend in part on the governance structure within which a doctor works. Indeed, thesis results did show that private physician owning pharmacies appeared to more strongly persuade patients to use their pharmacy than public physicians owning pharmacies. Future research could expand on this, by comparing doctors working within a wider range of health facility types. For example, doctors working in primary health centres or public tertiary hospitals may face different incentives to doctors working in primary or secondary level public hospitals. Further, doctors working in private for-profit hospitals and not-for-profit private hospitals contracted with government are likely to have different responses to incentives as well as face different incentives than doctors working in public hospitals.

It may also be valuable to more closely analyse the monitoring and regulatory role of third party purchasers of healthcare. In the Philippines, this involves a deeper understanding of how both LGUs and PHIC interact with health providers, particularly how they monitor doctor behaviour in hospitals and other health facilities. Monitoring and regulation may help explain observed differences in doctors' responses to incentives across districts. Indeed, results showed that external monitoring of public hospitals can increase the amount of effort exerted by doctors in such hospitals, but did not analyse why this was the case.

8.4.2 Analysing the effect of incentives on medical effort and quality in other settings

Results from this analysis of 30 districts in the Philippines are likely to be of value to other settings, both within the Philippines and in other countries. Nevertheless, findings are likely to vary in other settings, particularly because of differences in the

institutional environment. Undertaking similar research in countries with, amongst other factors, more autonomous public hospitals, a greater degree of contracting with private health facilities, tighter regulation of ancillary health facility ownership, as well as underlying cultural differences, may all contribute to doctors responding to incentives differently to Philippine doctors. Further, the relationship between medical effort and quality may also differ across countries, altering the impact supply-side incentives have on the quality of care patients receive. Therefore research in other settings would offer additional insights into how exactly the incentive structure influences the quality of health service delivery.

8.4.3 Evaluating potential conflicts in incentives

Results indicated that whilst doctors responded to a variety of predominantly financial incentives, effects were not always consistent. Research into potential conflicts between the incentives faced by different health providers and between different types of incentives could help explain this, particularly if undertaken on the same doctors analysed in this study.

For example, research into the potentially conflicting incentives between different health providers, particularly between frontline health workers (such as doctors and nurses) and higher-level health workers (such as hospital managers), could help explain why doctors did not always respond to hospital-level incentives. More qualitative assessments comparing the motivating factors of health workers operating at different levels within the health system may highlight differences and potential conflicts between health workers.

In terms of conflicts between different incentive types, the literature has suggested that altruistic concerns for a patient's well-being will counteract a doctor's more self-interested incentives. Capturing these conflicts between incentives requires empirical approaches based on psychological and more experimental economic methodologies (Frey and Jegen 2001).

8.4.4 Using more integrated approaches to analyse doctor behaviour

It was noted earlier that a general limitation of the empirical approach was that although the three results chapters of the thesis were conceptually connected, they remained separate analyses. Future research could potentially combine aspects from these analyses into a more integrated empirical analysis. This requires an empirical measure of medical effort that is understood in terms of the technical quality of care (as in the first results chapter of this thesis), and at the same time is linked to different incentives that influence the amount of effort doctors exert. Such a measure could be based, for instance, on patient exit surveys which accurately compare the services a patient with a specific illness received against the services that should be received according to 'best practice' guidelines. These surveys should also reflect whether the doctor recommended a patient to receive any healthcare in external ancillary facilities, and if so whether the doctor has links with such facilities.

8.4.5 Evaluating the impact of specific policy changes

A final area for future research relates to evaluations of specific policy changes that directly impact on the incentive structure within which doctors operate. This not only relates to pay-for-performance reforms and other provider payment mechanisms. For instance, analysis of changes to laws and regulations governing physician ownership of pharmacies would provide additional insights into the incentives inherent in ancillary health facility ownership. Another example relates to analysing the incentive effects of increased hospital autonomy, particularly how autonomy impacts upon the quality of healthcare received by different patients within the hospital. The advantage of such approaches is that, properly designed, they provide a natural experiment within which a change to the incentive structure can be analysed, and thus there is the potential for more robust conclusions being drawn from the results.

8.5 Concluding thoughts

The often inadequate quality of healthcare in low and middle income countries is not only due to the lack of well-trained health workers, functioning medical equipment, effective drugs and other essential inputs. A large and varied literature has demonstrated that the incentive structure within which health providers operate also explains inadequate quality of care. Thus to improve healthcare quality, policymakers need a better understanding of how doctors respond to incentives. This thesis attempted to shed light on how different aspects of the incentive structure impact upon the quality of care, through analysis of the healthcare received by patients in the lower-middle income country setting of the Philippines.

The thesis developed a conceptual framework based on the principal-agent model to show how financial and non-financial incentives can affect the amount of medical effort doctors exert on patients, and through this effort the quality of care. Empirical work derived from this conceptual framework showed that whilst the relationship between medical effort and quality is not straightforward, low effort typically results in lower quality care. Subsequent results illustrated how (predominantly financial) supply-side incentives can lead to: public hospital patients with equal health need being treated unequally; and pharmacy-owning physicians unduly influencing a patient's use and expenditure in pharmacies.

At the same time, results indicated that doctors' responses to financial incentives were rather mixed. This suggests that whilst doctors are not immune to perverse incentives, a doctor's concern for a patient's well-being moderates more self-interested responses to incentives. Moreover, supply-side incentives were shown to have positive as well as perverse effects on the quality of health service delivery. Suggested policy reforms are therefore based on reshaping the incentive structure, such that good quality healthcare is encouraged and inadequate quality care is penalised.

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Appendix A1: Evaluating the health consequences of inappropriate care

NOTES FOR DATA INPUT AND EVALUATION

Scale for health consequences

1. Expected health consequence (EHC)

- 3 definitely harmful
- 2 probably harmful
- 1 possibly harmful
- 0 health neutral
- 1 possibly beneficial
- 2 probably beneficial
- 3 definitely beneficial

2. Severity (complete only if treatment is harmful)

- A severe adverse event (life threatening or being admitted to hospital)
- B moderate adverse event (neither lasting nor severe)
- C mild adverse event (minor effects)

When evaluating the health consequence of specific treatment, evaluate it INDEPENDENTLY of anything else the physician does.

E.g. if giving dextrose drink *in itself* is health neutral, then write "0".

I.e. If physician gave this as substitute for IV fluids, that harmful health consequence will be captured separately.

For essential treatments, you should evaluate the health consequence of NOT doing that treatment.

For optional and additional treatments, you should evaluate the health consequence of doing that treatment (whether beneficial, neutral or harmful to the patient).

4 of the 15 QIDS vignettes are used here (diarrhoea vignettes #1 & #2, pneumonia vignettes #1 & #3). See QIDS vignette case sheets for full details on these 4 vignettes used.

DIARRHOEA VIGNETTE 'A' (= QIDS diarrhoea vignette #1)

Essential treatments NOT done:		EHC	severity
E1	Give oral rehydration solution in clinic over a period of 4 hours		
E2	Estimate quantity based on weight/dehydration (75 cc/kg x 4 hrs. or 400-600 ml in 4 hours)		
E3	Monitor for vomiting, urination, normalization of heart rate		
E4	Reassess the child after 3-4 hours and treat accordingly. (If still with some dehydration, continue treatment with ORS; or if signs of severe dehydration develop, treat as severe dehydration; or reassess before 4 hours if the child has not been taking the ORS well or if condition appears to worsen).		
E5	Antipyretic for fever (Paracetamol)		
E6	Once qualified for discharge, advise mother to return immediately if the child worsens (increased diarrhea, poor feeding or inability to drink, develops fever, urinates less than 2-3 times/day, or develops blood in the stool).		
E7	Advise mother on continued home care (show mother how to mix and give ORS - frequent small amounts of fluid; if child vomits, wait 10mins then resume by giving it more slowly/good feeding practice/proper hygiene/continued sensory stimulation/emotional support/regular follow up/updating immunization).		
E8	Recommend continued breastfeeding, give extra fluid several times/day		
E9	Recommend vitamin A, zinc, and calcium supplementation		
Additional treatments done:		EHC	severity
A1	Antibiotics (unspecified) - <u>assume</u> least harmful type & specify antibiotic		
A2	Ampicillin & Gentamycin		
A3	Cotrimoxazole		
A4	Dilute milk formula or change to non-lactose preparation		
A5	Hospitalisation		
A6	Metoclopramide		

DIARRHOEA VIGNETTE 'B' (= QIDS diarrhoea vignette #2)

Essential treatments NOT done:		EHC	severity
E1	Admit the child to hospital		
E2	Start IV fluids immediately.		
E3	Give IV fluids at appropriate rate. (Lactated Ringer's or 0.9% saline, not dextrose containing solution; fluids to be given at 100cc/kg as follows: <12 months: 30 cc/kg for the 1st hour followed by 70 cc/kg for the next 5 hrs; 12 mos. to 5 yrs.: 30cc/kg for the first 30 minutes followed by 70cc/kg in the next 2 and ½ hrs. While infusing the 30 cc/kg fluids, reassess child every 15-30 minutes until a good radial pulse is present. Repeat the infusion of the initial 30cc/kg if pulse is still weak or not detectable.)		
E4	Give ORS as soon as child can drink. If can drink, give ORS by mouth while the drip is set up		
E5	Estimate quantity of ORS based on weight/dehydration: (5 cc/kg).		
E6	Monitor for vomiting, urination, normalization of heart rate		
E7	Reassess the child after 3 hours. Re-classify hydration status and treat accordingly: If the same, continue with IV fluids; if improved and can tolerate p.o. fluids continue ORS; and reassess again in 4 hours		
E8	Once qualified for discharge, advise mother to return immediately if the child worsens (increased diarrhea, poor feeding or inability to drink, develops fever, urinates less than 2-3 times/day, or develops blood in the stool).		
E9	Advise mother on continued home care (same as Di1)		
Additional treatments done:		EHC	severity
A1	Antibiotics (unspecified) - <u>assume</u> least harmful type & specify antibiotic		
A2	Ampicillin (for Ecoli)		
A3	Antacid		
A4	BRAT Diet		
A5	Chloramphenicol		
A6	Cotrimoxazole		
A7	Diphenhydramine		
A8	Furoxone syrup		
A9	Lactobacilli		
A10	Metoclopramide		
A11	Metronidazole		
A12	NPO for 24 hrs then soft diet		
A13	O2 inhalation		
A14	Paracetamol		
A15	Potassium Chloride		
A16	Sodium Bicarbonate		
A17	Vitamin A		

PNEUMONIA VIGNETTE 'A' (= QIDS pneumonia vignette #1)

Essential treatments NOT done:		EHC	severity
E1	Antibiotics. (oral cotrimoxazole for 5 days or oral amoxicillin for 5 days or Ceftriaxone)		
E2	Treat fever (paracetamol)		
E3	If improved, finish antibiotic for 5 days. If no improvement, change to second line antibiotic and reassess after 2 days or refer. If worse, admit to the hospital		
E4	Outpatient management with a follow up visit scheduled after 2 days (earlier if the child is getting worse) to reassess		
E5	Once discharged, advise mother to give home care (appropriate fluid intake, continued breastfeeding, small frequent meals, clearing the nose, avoiding overheating or chilling)		
Optional treatment done:		EHC	severity
O1	Home made cough remedies and warm herbal teas		
Additional treatments done:		EHC	severity
A1	Oral phenoxymethyl-penicillin; erythromycin; cefalexin: <u>assume</u> least harmful type & specify		
A2	Admitted to hospital		
A3	Ambroxol		
A4	Ampicillin		
A5	b-2 agonists		
A6	Benzylpenicillin		
A7	Broncho dilators		
A8	Carbocistine		
A9	Cefalexin		
A10	Cefuroxime d5mg/5ml BID		
A11	Chloramphenicol		
A12	Chloramphenicol		
A13	complete immunization, esp HIB		
A14	Gentamicin		
A15	mucolytics - cartocysteine cartocyst		
A16	mucolytics; b-2 agonists		
A17	Nebulization & Salbutamol		
A18	O2 Inhalation		
A19	Phenylpropanolamine		
A20	Salbutamol		
A21	Vitamin A		

PNEUMONIA VIGNETTE 'B' (= QIDS pneumonia vignette #3)

Essential treatments NOT done:		EHC	severity
E1	Outpatient management (can be implied)		
E2	Treat fever (as needed)		
E3	Outpatient follow-up scheduled to reassess after 2 days or earlier if child is getting worse		
E4	Once discharged, advise mother to give home care (appropriate fluid intake, continued feeding appropriate for age, small frequent meals)		
Optional treatment done:		EHC	severity
O1	Humidified oxygen		
O2	Cough suppressants (eg dextromethorphan, homemade cough remedies, warm herbal tea)		
Additional treatments done:		EHC	severity
A1	Antibiotics (unspecified) - <u>assume</u> least harmful type & specify antibiotic		
A2	Expectorants or antihistamines (unspecified) - <u>assume</u> least harmful type & specify		
A3	Ambroxol		
A4	Amoxicillin		
A5	Amoxicillin, shift after 3 days to Macralides if no improvement		
A6	Ascorbic acid		
A7	Broncholytics		
A8	Carbocistine		
A9	Cetirizine		
A10	Chlorpheniramine malate		
A11	Decongestants		
A12	Fluid intake		
A13	Fluid therapy		
A14	If patient don't get well, start after few days ampicillin and gentamycin, ceferroxine		
A15	If secondary bacterial infect occur, may give antibiotics		
A16	Isoprophine		
A17	Multivitamins & Iron		
A18	Salbutamol		
A19	Sodium citrate		
A20	Steam inhalation		
A21	Tepid sponge bath		
A22	Vitamin A		
A23	Vitamin C		
A24	Zinc Supplementation		

B. Enumerator data

A6

B.1. Date of interview MM/DD/YY

B.2. Time started ____ : ____

B.3. Time completed ____ : ____

B.4. Total Time: ____ : ____

B.5. Interviewer ID _____

B.6. Interviewer signature

B.7. Tracking Information

Instruction for Interviewer: Ask for the names, addresses, contact numbers and relationship to household head of 1 family member and 1 close relative that do not live in the respondent's house and for the name and address of 1 neighbor. This information will be used to track the respondent for subsequent interviews.

Name in full	Address	Phone Numbers	Relationship
1		land _____ mob _____	
2		land _____ mob _____	
3		land _____ mob _____	

C. Instrument review

C.1. Field supervisor: review date MM/DD/YY

C.1.1 Field Supervisor signature

C.2. Editor: review date MM/DD/YY

C.2.1 Editor signature

C.3. Data encoder date MM/DD/YY

C.3.1 Encoder signature

C.4 2nd encoder date MM/DD/YY

C.4.1 2nd encoder signature

D. Consent

A7

Dear Respondent,

The Quality Improvement Demonstration Study (QIDS) HSRA is a four-year project supported by the U.S. National Institutes of Health. The partner Institutions in the Philippines are the Department of Health, PhilHealth, the University of California, San Francisco and the UPEcon Foundation. The primary objective of this study is to determine the effectiveness of certain health policy interventions on the health status of children. The project will focus on children 0-4 years old who have suffered from common childhood illnesses in the past week

It is with great pleasure to inform you that you and your child have been selected to participate in this study. Specifically, we would like to know your opinions and experiences as clients of this hospital. The interview will take about 1 1/2 hours. We will ask you some questions, measure and weigh your child if that hasn't been done today, and take a very small sample of blood to do some tests. After we speak with you we will review your child's medical record to verify services received and hospital charges. Four to six weeks from today a member of the research team will come and visit you at your house to do a follow-up on the health of your child.

The information that you will provide today and again in 4-6 weeks will be treated with utmost confidentiality. The data will be used for research purposes only, although we will tell you the results of your child's tests. Your name or address and other personal information will eventually be deleted from the questionnaire and only a code or number will connect your name with your answers.

Your participation is voluntary. You may refuse to answer any question which you consider sensitive or confidential. Be assured that your answers will not affect your or your family's ability to receive care at this or any other hospital or clinic. If you have any questions, you can ask me or can contact our survey supervisor at UP Diliman by calling Romy Marcalda at (02) 928-1933. You can also call Dr Stella Quimbo at UP Diliman at (02) 920-5461.

Your signature indicates that you understood the purpose and mechanics of this study and that you are willing to participate.

Signature of guardian _____ Signature of interviewer _____

Date: / /
 M M D D Y Y

Did respondent.....

Consent and sign?

Consent but not sign?

Refuse to participate?

E. General information on patient/Index child

From this point forward, we are collecting information on a child we are referring to as the INDEX CHILD.
This child is the one selected and given an ID number on page one. You will need to confirm that this child is not more than 4 years and 10 months old and has been hospitalized and is being discharged today or tomorrow.
Wherever a question reads _____'s or _____ (INDEX CHILD)'s, please substitute the name of the child.

- E.1. Sex (observe and verify by asking if necessary)
- Male..... 1
Female..... 2
- E.2. What is the highest grade of schooling that _____ (INDEX CHILD) has attended?
- Not attended..... 1
Nursery..... 2
Kinder 1..... 3
Prep or Kinder 2..... 4
Grade 1..... 5
- E.3. How many years of schooling were completed by the father of _____ (INDEX CHILD)?
- _____ years
Don't Know..... 99
- E.4. How many years of schooling were completed by the mother of _____ (INDEX CHILD) ?
- _____ years
Don't Know..... 99
- E.5. Who is _____(INDEX CHILD) currently living with?
- (Choose one)
Both parents..... 1
Mother only..... 2
Father only..... 3
Grandparents..... 4
Other relatives..... 5
Other persons, not relatives... 6

- E.6. Who is the primary income earner in the household?
- Mother..... 1
Father..... 2
Grandparent..... 3
Sibling..... 4
Other relatives..... 5
Other persons, not relatives... 6
OFW not living in household 7
Person not living in household, not OFW 8
- E.6.1 What is this person's name? _____
Note to interviewer:
(In the following questions, please substitute this person's name where ever you see (PRIMARY INCOME EARNER))
- E.7. What is _____'s (PRIMARY INCOME EARNER) work status at his/her primary job?
(His/her primary job is the job that occupies most of his/her time)
- Self employed without help..... 1
Self employed with help..... 2
Government worker/employee..... 3
Work for a private firm or company... 4
Unpaid family worker..... 5
- E.8 What was the main activity of _____(PRIMARY INCOME EARNER) during the last month?
- Working/helping to earn income..... 1
Job searching..... 2
Housekeeping..... 3
Unemployed..... 4
Retired..... 5
Retired government worker/employee 6
Retired private firm worker 7

A9

E.9. How much does _____ (PRIMARY INCOME EARNER) earn at his/her primary job per month?

_____ pesos

E.10. Does _____ (PRIMARY INCOME EARNER) have a spouse?

Yes..... 1
No(Skip to E15)..... 2

E.11. If yes, is the spouse working?

Yes..... 1
No(Skip to E15)..... 2

E.12 What is _____'s (PRIMARY INCOME EARNER) SPOUSE's work status at his/her primary job?
(His/her primary job is the job that occupies most of his/her time)

Self employed without help..... 1
Self employed with help..... 2
Government worker/employee..... 3
Work for a private firm or company... 4
Unpaid family worker..... 5
Retired government worker/employee 6
Retired private firm worker 7

E.13 What was the main activity of _____'s (PRIMARY INCOME EARNER)'s SPOUSE during the last month?

Working/helping to earn income..... 1
Job searching..... 2
Housekeeping..... 3
Unemployed..... 4
Retired..... 5

For E.14-E.20, earnings refer to *net* or *take-home* pay.

E.14 How much does _____ (PRIMARY INCOME EARNER)'s SPOUSE earn at his/her primary job per month?

_____ pesos

E.15 How much TOTAL per month does both _____ (PRIMARY INCOME EARNER) and _____'s (PRIMARY INCOME EARNER) SPOUSE usually earn at their jobs, after contributions for taxes, social security, the health fund, the pension fund, etc.?

_____ pesos

E.16 What was the TOTAL value of any bonuses, commissions, tips, or allowances received by (PRIMARY INCOME EARNER) and _____'s (PRIMARY INCOME EARNER) SPOUSE (for this work/at these jobs) in the last 12 months?

_____ pesos

E.17 What was the TOTAL value of other things received by the couple as payment for their work , (e.g., food, transportation, housing) in the last 12 months?
AN APPROXIMATION IS OKAY.

_____ pesos

E.18 How much TOTAL extra money did (PRIMARY INCOME EARNER AND PRIMARY INCOME EARNER'S SPOUSE) earn from all other work during the last 12 months?

_____ pesos

E.19 How much TOTAL money did (PRIMARY INCOME EARNER AND PRIMARY INCOME EARNER'S SPOUSE) receive from family and friends in the last 12 months?

_____ pesos

E.20 What was the approximate TOTAL income of your household in the last 12 months?

_____ pesos

F. Child Health Status

		A10	
F.1	How would you rate _____'s (<i>INDEX CHILD</i> 's) overall health?	Excellent.....	1
		Very Good.....	2
		Good.....	3
		Fair.....	4
		Poor.....	5
F.2	Compared to others his/her age, how would you rate _____'s (<i>INDEX CHILD</i> 's) overall health?	Excellent.....	1
		Very Good.....	2
		Good.....	3
		Fair.....	4
		Poor.....	5
F.3	How would you rate _____'s (<i>INDEX CHILD</i> 's) overall health compared to one year ago?	Much better now.....	1
		Somewhat better now	2
		About the same.....	3
		Somewhat worse now	4
		Much worse now.....	5
F.4	How would you rate _____'s (<i>INDEX CHILD</i> 's) overall mental development?	Excellent.....	1
		Very Good.....	2
		Good.....	3
		Fair.....	4
		Poor.....	5
F.5	Compared to others his/her age, how would you rate _____'s (<i>INDEX CHILD</i> 's) overall mental development?	Excellent.....	1
		Very Good.....	2
		Good.....	3
		Fair.....	4
		Poor.....	5

F.6	How would you rate _____'s (<i>INDEX CHILD</i> 's) overall mental development compared to one year ago?	Much better now.....	1
		Somewhat better now	2
		About the same.....	3
		Somewhat worse now	4
		Much worse now.....	5

G. Symptoms just before this hospitalization

G.1	In the immediate period leading up to this hospitalization, what symptoms did _____ (INDEX CHILD) experience?		
(Circle all that apply)			
G.1.1	Any fever	Yes.....	1
		No.....	2
		DK/Ref.....	99
G.1.2	High fever (above 38.5 C or 101.5 F)	Yes.....	1
		No.....	2
		DK/Ref.....	99
G.1.3	Cough	Yes.....	1
		No.....	2
		DK/Ref.....	99
G.1.4	Difficult or fast breathing	Yes.....	1
		No.....	2
		DK/Ref.....	99
G.1.5	Shortness of breath	Yes.....	1
		No.....	2
		DK/Ref.....	99

		A11
G.1.6	Diarrhea	Yes..... 1 No..... 2 DK/Ref..... 99
G.1.7	Blood in the stool	Yes..... 1 No..... 2 DK/Ref..... 99
G.1.8	Vomiting	Yes..... 1 No..... 2 DK/Ref..... 99
G.1.9	Abdominal cramping or pain	Yes..... 1 No..... 2 DK/Ref..... 99
G.1.10	Loss of appetite	Yes..... 1 No..... 2 DK/Ref..... 99
G.1.11	Convulsions	Yes..... 1 No..... 2 DK/Ref..... 99
G.1.12	Others, specify: _____ _____	Yes..... 1 No..... 2 DK/Ref..... 99

G.2 Was _____(INDEX CHILD) given initial treatment for his/her illness before visiting a medical care provider?

Yes..... 1
No (Skip to G.4) 2

G.3 What kind of initial treatment was given to _____ (INDEX CHILD) ? (Circle all that apply)

G.3.1 Herbal medicine or other traditional methods..... 1
G.3.2 Self medication/over the counter drugs purchased at pharmacy..... 2
G.3.3 Others (specify) _____ 3

G.4 After the appearance of the first symptoms, when did you bring _____ (INDEX CHILD) to a medical facility or clinic?

Within 24 hours (1st day)..... 1
Within 25-48 hours (2nd day)..... 2
Within 49-72 hours (3rd day)..... 3
After 72 hours (4th day or more)..... 4
Don't know..... 99

G.5 Did you bring _____(INDEX CHILD) for this initial medical care to this district hospital?

Yes (Skip to G.8).. 1
No..... 2

G.6 What type of facility did you bring _____ (INDEX CHILD) to initially?

Barangay Health Station.. 1
Rural Health Center..... 2
District Hospital 3
Provincial Hospital..... 4
Regional Hospital..... 5
Private hospital..... 6
Private clinic..... 7
Community Hospital..... 8
Others..... 9

G.7

After the appearance of the first symptoms, when did you bring _____ (INDEX CHILD) to THIS hospital?

A12

Within 24 hours (1st day).....

Within 25-48 hours (2nd day).....

Within 49-72 hours (3rd day).....

After 72 hours (4th day or more).....

Don't know.....

1

2

3

4

99

G.8

Why did you choose to consult in this hospital instead of other hospitals or clinics?

(Circle up to two items)

G.8.1 Lower costs.....

G.8.2 Accredited by PhilHealth.....

G.8.3 Accredited by other insurance institutions....

G.8.4 Short distance from home.....

G.8.5 Easy transportation.....

G.8.6 Adequate facilities.....

G.8.7 Quality of care.....

G.8.8 Referred here.....

G.8.9 Others (specify).....

1

2

3

4

5

6

7

8

9

G.9

How much time did you spend traveling to this facility?

_____ minutes

G.10

How many times, if at all, has your child been hospitalized for this same condition since he/she was born excluding this present hospitalization?

H. Description of confinement

H.1

Which department did you visit when you first came to this hospital?

Outpatient Department.....

Emergency Department.....

Pediatrics Department.....

Laboratory.....

X-ray or Ultrasound.....

Others (specify).....

Don't know.....

1

2

3

4

5

6

99

H.2

What was the total number of days your child was confined in this hospital?

_____ days

H.3

What ward was your child confined in?

Pedia.....

Non- Pedia.....

Mixed.....

Other, Specify.....

Don't know.....

1

2

3

4

99

H.3.1

What type of ward was it?

Pay.....

Medicare.....

Charity.....

Mixed.....

Other, Specify.....

Don't know.....

1

2

3

4

5

99

H.4

Was your child cared for by a doctor?

(Circle one)

Yes, one main doctor..... 1

Yes several different doctors(Skip to H.8)..... 2

No, only nurses and other staff (Skip to H.9)..... 3

Don't know (Skip to H.9) 99

H.5

What was that Doctor's name? (Include first and last name)

H.6

Was your child's doctor a man or a woman?

Man..... 1

Woman..... 2

H.7

What kind of doctor took care of your child?

(Circle one)

General Practioner..... 1

Family Doctor..... 2

Pediatrician..... 3

Sub-specialist..... 4

Other, 5

DK..... 99

H.8

How long did you wait after arriving at the hospital for a doctor to first attend to your child? (List in minutes)

H.9

How many times was your child visited by a physician during his or her confinement?

H.10

What was the outcome of your child's confinement? (Circle One)

Discharged fully recovered..... 1

Discharged feeling better but not fully recovered..... 2

Discharged feeling worse and referred to another facility..... 3

Discharged feeling worse with continued care at home..... 4

Other, specify 5

I. Services and medical expenditures

Next I would like to ask about the services your child received and the amount you paid for them

Service	I.1 Received/Given IN		I.2 Number of times	I.3 Cost per Unit in pesos	I.4 Received/ Given OUTSIDE of		I.5 Number of times	I.6 Cost per Unit in pesos
	Yes	No			Yes	No		
1 X-rays	1	2			1	2		
2 Ultrasound	1	2			1	2		
3 Lumbar puncture	1	2			1	2		
4 Intubation	1	2			1	2		
5 Lab tests	1	2			1	2		
6 Specialist Consultation	1	2			1	2		
7 General doctor visit	1	2			1	2		
8 Oral medicine	1	2			1	2		
9 Injected medication	1	2			1	2		
10 Intravenous Fluids	1	2			1	2		
11 Intravenous medication	1	2			1	2		

I.7

How much did you pay for Room and Board?

pesos

I.8

What were the TOTAL charges IN the hospital?

pesos

I.9

What were the TOTAL charges OUTSIDE the hospital?

pesos

I.10

Was your child prescribed medicine to take once he or she is discharged from the hospital?

Yes..... 1

No (Skip to Section I.14).. 2

I.11

Did you obtain any of these discharge medicines at the hospital?

Yes..... 1

No..... 2

I.11.1

How much did these medications cost?

pesos

I.12

Have you purchased any of the medicines or do you plan to purchase any of the medicines outside the hospital?

Yes..... 1

No..... 2

I.13

How much did/do these discharge medicine(s) cost?

pesos

Don't Know..... 99

I.14

During your child's confinement, how much did you spend on non-medical things such as the following...
Please include costs for both child and yourself or other caretakers

1. Transportation

pesos

2. Food

pesos

3. Others

pesos

J. Payment sources for this hospitalization

J.1

Is (INDEX CHILD) enrolled in PhilHealth?
(Note: If they say no, probe by checking if the family has a GMA card or has Medicare Para sa Masa.)

Yes..... 1

No (Skip to J.5) 2

DK 99

J.2

Were any of the services received services that are covered by PHIC?

Yes 1

No...(Skip to J.5)..... 2

DK..... 99

J.3

Did you make a claim?

Yes ..(Skip to J.5)..... 1

No..... 2

DK..... 99

J.4

If not do you plan to make a claim?

Yes..... 1

No..... 2

Of the total spent on this hospitalization, how much was paid for by...

J.5. Own HH resources/savings/income.....

pesos

J.6. Personal loans including from family members that do not live with you.....

pesos

J.7. Sale of property.....

pesos

J.8. Transfers, donations from charities or local government officials.....

pesos

J.9. PhilHealth.....

pesos

J.10. Private insurance.....

pesos

J.11 Other insurance.....

pesos

J.12 Others, specify.....

pesos

Appendix A2

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K. Patient satisfaction SHORT FORM PATIENT SATISFACTION QUESTIONNAIRE (PSQ-18)

These next questions are about how you feel about the medical care your child receives
On the following pages are some things people say about medical care. Please listen to each one carefully, keeping in mind the medical care your child is receiving right now. (If your child has not received care recently, think about what you would expect if you needed care today). We are interested in your feelings, good and bad, about the medical care your child has received. As with everything you tell us today, your answers will be kept strictly confidential.

How strongly do you AGREE or DISAGREE with each of the following statements *Circle response*

K1. Doctors are good about explaining the reason for medical tests.....	Strongly Agree.....	1
	Agree.....	2
	Uncertain.....	3
	Disagree.....	4
	Strongly Disagree.....	5
	DK/Ref	99
K2. I think my doctor has everything needed to provide complete medical care	Strongly Agree.....	1
	Agree.....	2
	Uncertain.....	3
	Disagree.....	4
	Strongly Disagree.....	5
	DK/Ref	99
K3. The medical care my child has been receiving is just about perfect.....	Strongly Agree.....	1
	Agree.....	2
	Uncertain.....	3
	Disagree.....	4
	Strongly Disagree.....	5
	DK/Ref	99
K4. Sometimes doctors make me wonder if their diagnosis is correct.....	Strongly Agree.....	1
	Agree.....	2
	Uncertain.....	3
	Disagree.....	4
	Strongly Disagree.....	5
	DK/Ref	99
K5. I feel confident that I can get the medical care my child needs without being set back financially.....	Strongly Agree.....	1
	Agree.....	2
	Uncertain.....	3
	Disagree.....	4
	Strongly Disagree.....	5
	DK/Ref	99
K6. When I go for medical care, they are careful to check everything when treating and examining my child.....	Strongly Agree.....	1
	Agree.....	2
	Uncertain.....	3
	Disagree.....	4
	Strongly Disagree.....	5
	DK/Ref	99
K7. I have to pay for more of my child's medical care than I can afford.....	Strongly Agree.....	1
	Agree.....	2
	Uncertain.....	3
	Disagree.....	4
	Strongly Disagree.....	5
	DK/Ref	99

A18

K8. I have easy access to the medical specialists my child needs.....

Strongly Agree..... 1
 Agree..... 2
 Uncertain..... 3
 Disagree..... 4
 Strongly Disagree..... 5
 DK/Ref 99

K9. Where my child gets medical care, people have to wait too long for emergency treatment.....

Strongly Agree..... 1
 Agree..... 2
 Uncertain..... 3
 Disagree..... 4
 Strongly Disagree..... 5
 DK/Ref 99

K10. Doctors act too businesslike and impersonal towards me and my child.....

Strongly Agree..... 1
 Agree..... 2
 Uncertain..... 3
 Disagree..... 4
 Strongly Disagree..... 5
 DK/Ref 99

K11. My doctors treat my child in a very friendly and courteous manner.....

Strongly Agree..... 1
 Agree..... 2
 Uncertain..... 3
 Disagree..... 4
 Strongly Disagree..... 5
 DK/Ref 99

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K12. Those who provide my child's medical care sometimes hurry too much when they treat my child.....

Strongly Agree..... 1
 Agree..... 2
 Uncertain..... 3
 Disagree..... 4
 Strongly Disagree..... 5
 DK/Ref 99

K13. Doctors sometimes ignore what I tell them.....

Agree..... 2
 Uncertain..... 3
 Disagree..... 4
 Strongly Disagree..... 5
 DK/Ref 99

K14. I have some doubts about the ability of the doctors that treat my child

Strongly Agree..... 1
 Agree..... 2
 Uncertain..... 3
 Disagree..... 4
 Strongly Disagree..... 5
 DK/Ref 99

K15. Doctors usually spend plenty of time with my child

Strongly Agree..... 1
 Agree..... 2
 Uncertain..... 3
 Disagree..... 4
 Strongly Disagree..... 5
 DK/Ref 99

K16. I find it hard to get an appointment for medical care right away.....	Strongly Agree.....	1	A17
	Agree.....	2	
	Uncertain.....	3	
	Disagree.....	4	
	Strongly Disagree.....	5	
	DK/Ref	99	
K17. I am dissatisfied with some things about the medical care my child receives.....	Strongly Agree.....	1	
	Agree.....	2	
	Uncertain.....	3	
	Disagree.....	4	
	Strongly Disagree.....	5	
	DK/Ref	99	
K18. I am able to get medical care for my child whenever I need it.....	Strongly Agree.....	1	
	Agree.....	2	
	Uncertain.....	3	
	Disagree.....	4	
	Strongly Disagree.....	5	
	DK/Ref	99	

L TAPQOL Questionnaire for parents of children aged 6 months to 4 years 11 months

INSTRUCTIONS

The questions in this questionnaire relate to the different aspects of your child's health. You can answer the questions by telling me the answer that best describes your child. If things were not entirely satisfactory, you are also asked how your child felt when there was a problem. So, if you say that your child had ear ache 'occasionally' or 'often', you can state, in the second part of the question, how your child felt at that time,

In the last three months, did (INDEX child) have ..			
L.1. Ear ache? (Circle one)	Never..(Skip to L.3)...	1	L.2.At that time, my child felt: (Circle one)
	Occasionally.....	2	
	Often.....	3	
L.3. Stomach-ache or abdominal pain? (Circle one)	Never..(Skip to L.5)...	1	L.4.At that time, my child felt: (Circle one)
	Occasionally.....	2	
	Often.....	3	
L.5. Colic (Circle one)	Never..(Skip to L.7)...	1	L.6.At that time, my child felt: (Circle one)
	Occasionally.....	2	
	Often.....	3	
L.7. Eczema (Circle one)	Never..(Skip to L.9)...	1	L.8.At that time, my child felt: (Circle one)
	Occasionally.....	2	
	Often.....	3	
			Fine..... 1
			Not so good..... 2
			Quite Bad..... 3
			Bad..... 4
			Not applicable 97

L.9 Itchiness (Circle one)		L.10.At that time, my child felt: (Circle one)	A18
Never..(Skip to L.11)..	1	Fine.....	1
Occasionally.....	2	Not so good.....	2
Often.....	3	Quite Bad.....	3
		Bad.....	4
		Not applicable	97
L.11. Dry skin (Circle one)		L.12.At that time, my child felt: (Circle one)	
Never..(Skip to L.13)..	1	Fine.....	1
Occasionally.....	2	Not so good.....	2
Often.....	3	Quite Bad.....	3
		Bad.....	4
		Not applicable	97
L.13. Bronchitis (Circle one)		L.14.At that time, my child felt: (Circle one)	
Never..(Skip to L.15)..	1	Fine.....	1
Occasionally.....	2	Not so good.....	2
Often.....	3	Quite Bad.....	3
		Bad.....	4
		Not applicable	97
L.15. Difficulty with breathing or lung problems (Circle one)		L.16.At that time, my child felt: (Circle one)	
Never..(Skip to L.17)..	1	Fine.....	1
Occasionally.....	2	Not so good.....	2
Often.....	3	Quite Bad.....	3
		Bad.....	4
		Not applicable	97
In the last three months, has your child been			
L. 17. Short of breath (Circle one)		L.18.At that time, my child felt: (Circle one)	
Never..(Skip to L.19)..	1	Fine.....	1
Occasionally.....	2	Not so good.....	2
Often.....	3	Quite Bad.....	3
		Bad.....	4
		Not applicable	97

L.19. Nauseous (Circle one)		L.20.At that time, my child felt: (Circle one)	
Never..(Skip to L.21)..	1	Fine.....	1
Occasionally.....	2	Not so good.....	2
Often.....	3	Quite Bad.....	3
		Bad.....	4
		Not applicable	97
How did your child sleep in the last three months?			
L.21. Did your child sleep restlessly? (Circle one)		L.22.At that time, my child felt: (Circle one)	
Never..(Skip to L.23)..	1	Fine.....	1
Occasionally.....	2	Not so good.....	2
Often.....	3	Quite Bad.....	3
		Bad.....	4
		Not applicable	97
L.23. Was your child awake at night? (Circle one)		L.24.At that time, my child felt: (Circle one)	
Never..(Skip to L.25)..	1	Fine.....	1
Occasionally.....	2	Not so good.....	2
Often.....	3	Quite Bad.....	3
		Bad.....	4
		Not applicable	97
L.25. Did your child cry at night? (Circle one)		L.26.At that time, my child felt: (Circle one)	
Never..(Skip to L.27)..	1	Fine.....	1
Occasionally.....	2	Not so good.....	2
Often.....	3	Quite Bad.....	3
		Bad.....	4
		Not applicable	97
L. 27. Did your child have difficulty sleeping through the night? (Circle one)		L.28.At that time, my child felt: (Circle one)	
Never..(Skip to L.29)..	1	Fine.....	1
Occasionally.....	2	Not so good.....	2
Often.....	3	Quite Bad.....	3
		Bad.....	4
		Not applicable	97

How did your child eat and drink in the last three months?		A19
L.29. Was your child's appetite poor? (Circle one)	L.30. At that time, my child felt: (Circle one)	
Never..(Skip to L.31).. 1	Fine..... 1	
Occasionally..... 2	Not so good..... 2	
Often..... 3	Quite Bad..... 3	
	Bad..... 4	
	Not applicable 97	
L.31. Did your child have difficulty eating enough? (Circle one)	L.32. At that time, my child felt: (Circle one)	
Never..(Skip to L.33).. 1	Fine..... 1	
Occasionally..... 2	Not so good..... 2	
Often..... 3	Quite Bad..... 3	
	Bad..... 4	
	Not applicable 97	
L. 33. Did your child refuse to eat? (Circle one)	L.34. At that time, my child felt: (Circle one)	
Never..(Skip to L.35).. 1	Fine..... 1	
Occasionally..... 2	Not so good..... 2	
Often..... 3	Quite Bad..... 3	
	Bad..... 4	
	Not applicable 97	
Your child's behavior in the last three months		

L.35. My child was short-tempered (Circle one)	Never 1
	Occasionally..... 2
	Often..... 3
L.36. My child was aggressive (Circle one)	Never 1
	Occasionally..... 2
	Often..... 3
L.37. My child was irritable (Circle one)	Never 1
	Occasionally..... 2
	Often..... 3

L.38. My child was angry (Circle one)	Never 1
	Occasionally..... 2
	Often..... 3
L.39. My child was restless or impatient with me (Circle one)	Never 1
	Occasionally..... 2
	Often..... 3
L.40. My child defiant/ awkward with me (Circle one)	Never 1
	Occasionally..... 2
	Often..... 3
L.41. I could not manage my child (Circle one)	Never 1
	Occasionally..... 2
	Often..... 3
How was your child in the last three months?	
L.42. In good spirits (Circle one)	Never 1
	Occasionally..... 2
	Often..... 3
L.43. Cheerful (Circle one)	Never 1
	Occasionally..... 2
	Often..... 3
L.44. Happy (Circle one)	Never 1
	Occasionally..... 2
	Often..... 3

		A20	
L.45. Frightened (Circle one)		Never	1
		Occasionally.....	2
		Often.....	3
L.46. Tense (Circle one)		Never	1
		Occasionally.....	2
		Often.....	3
L.47. Anxious (Circle one)		Never	1
		Occasionally.....	2
		Often.....	3
L.48. Energetic (Circle one)		Never	1
		Occasionally.....	2
		Often.....	3
L.49. Active (Circle one)		Never	1
		Occasionally.....	2
		Often.....	3
L.50. Lively (Circle one)		Never	1
		Occasionally.....	2
		Often.....	3

(For children older than 18 months only. For children younger than 18 months skip to Section M.)				
How was your child's behavior in the last three months?				
L.51. My child was able to play happily with other children (Circle one)		Never	1	
		Occasionally.....	2	
		Often.....	3	
L.52. My child was at ease with other children (Circle one)		Never	1	
		Occasionally.....	2	
		Often.....	3	
L.53. My child was confident with other children (Circle one)		Never	1	
		Occasionally.....	2	
		Often.....	3	
In the last three months, did your child have, compared with other children of the same age,				
L.54. Difficulty with walking? (Circle one)		L.55. At that time, my child felt		
No...(Skip to L56).....		1	Fine.....	1
Yes, a little.....		2	Not so good.....	2
Yes, a lot.....		3	Quite bad.....	3
Cannot walk.....		4	Bad.....	4
			Not applicable.....	97
L.56. Difficulty with running? (Circle one)		L.57. At that time, my child felt		
No...(Skip to L58).....		1	Fine.....	1
Yes, a little.....		2	Not so good.....	2
Yes, a lot.....		3	Quite bad.....	3
Cannot walk.....		4	Bad.....	4
			Not applicable.....	97
L.58. Difficulty with walking up the stairs without help? (Circle one)		L.59. At that time, my child felt (Circle one)		
No...(Skip to L60).....		1	Fine.....	1
Yes, a little.....		2	Not so good.....	2
Yes, a lot.....		3	Quite bad.....	3
Cannot walk.....		4	Bad.....	4
			Not applicable.....	97

L.60. Difficulty with balance? (Circle one)		L.61. At that time, my child felt		A21
	No...(Skip to L62).....	1	Fine.....	1
	Yes, a little.....	2	Not so good.....	2
	Yes, a lot.....	3	Quite bad.....	3
	Cannot walk.....	4	Bad.....	4
			Not applicable.....	97
In the last three months, did your child have, compared with other children of the same age,				
L.62. Difficulty in understanding what others said? (Circle one)		L.63. At that time, my child felt		
	No...(Skip to L64).....	1	Fine.....	1
	Yes, a little.....	2	Not so good.....	2
	Yes, a lot.....	3	Quite bad.....	3
			Bad.....	4
			Not applicable.....	97
L.64. Difficulty in talking clearly? (Circle one)		L.65. At that time, my child felt		
	Never..(Skip to L.66)..	1	Fine.....	1
	Occasionally.....	2	Not so good.....	2
	Often.....	3	Quite bad.....	3
			Bad.....	4
			Not applicable.....	97
L.66. Difficulty in saying what he/ she meant? (Circle one)		L.67. At that time, my child felt		
	Never..(Skip to L.68)..	1	Fine.....	1
	Occasionally.....	2	Not so good.....	2
	Often.....	3	Quite bad.....	3
			Bad.....	4
			Not applicable.....	97
L.68. Difficulty in making it clear what he/ she wanted? (Circle one)		L.69. At that time, my child felt		
	Never (Skip to Sec M)	1	Fine.....	1
	Occasionally.....	2	Not so good.....	2
	Often.....	3	Quite bad.....	3
			Bad.....	4
			Not applicable.....	97

M. Anthropometrics

M.1	Height (Take measurement while child is lying down)		
	First measurement	_____ . _____	centimeters
	Second measurement	_____ . _____	centimeters
M.2	Weight (Weight should be taken without any clothes or diaper)		
	First measurement	_____ . _____	kilograms
	Second measurement	_____ . _____	kilograms

N. Blood Tests

A22

Now we will take a small sample of blood from your child to measure levels of hemoglobin, lead, folate and c-reactive protein. These tests will give a a biological measure of your child's health and may provide you with important health information. We will bring you your results when we visit you at home in 4-6 weeks to do a follow-up survey. If the tests find anything that requires medical attention for your child we will notify you right away.
Please record the status and/or result for each test:

N.1 Hemoglobin

Circle all that apply

Completed1

Done on site2

Sent to local lab3

Sent to Manila4

Result: .

N.2 CRP

Complete1

Done on site2

Sent to local lab3

Sent to Manila4

02a

Positive1

Negative2

If positive, 02b

Result:

DilutionConcentration

1:1 = 0.81

1:2 = 1.62

1:4 = 3.23

1:8 = 6.44

1:16 = 12.85

1:32 = 25.66

N.3 Lead

Complete1

Done on site2

Sent to local lab3

Sent to Manila4

(to be filled in at central office Result: .

N.4 Folate

Complete1

Done on site2

Sent to local lab3

Sent to Manila4

Hematocrit: %

(to be filled in at central office Result: .

For interviewer:

N.5 Where did you draw the blood?

(Circle all that apply)

N.5.1 Arm.....1

N.5.2 Hand.....2

N.5.3 Foot.....3

N.5.4 Finger stick.....4

N.5.5 Other 5

N.6 Which side of the body?

N.6.1 Left side6

N.6.2 Right side7

N.7 Were you able to obtain a blood sample?

Yes.....1

No.....2

If no, why not?

If no, when will you go back to draw sample?

Later today.....1

Tomorrow.....2

Later this week.....3

O. Record Review

For this next section please review the patient's medical record and, if possible hospital billing records

Services (list individually)	Total charge in pesos	Billed to Philhealth in pesos	Billed to other in pesos	Charged to patient in pesos	Charity in pesos
Diagnostic tests (lab, Xray,etc)					
Drugs and medicines					
Professional fees					

Services (list individually)	Total charge in pesos	Billed to Philhealth in pesos	Billed to other in pesos	Charged to patient in pesos	Charity in pesos
Room and Board					
Treatments					

Discharge diagnosis : _____

Doctor caring for patient: _____
last name first name

office telephone number other than this district hospital

cellphone number

Appendix A3: QIDS FACILITY SURVEY QUESTIONNAIRE

A. Sampling Information *(Write in and provide codes on right hand margin)*

A24

A.1	Region					
A.2	Province					
A.3	District					
A.4	Type of study district					
A.5	Round					
A.6	Municipality					
A.7	Facility ID	Reg	Prov	Dis	Typ	Rd
A.8	Hospital name					
A.9	Hospital address	No	Street	Barangay	Municipality	
A.10	Hospital GPS coordinates					
A.11	Informants	Please enter the name and position of each informant for this interview:				
		Position	Name	Title		
A.11.1	Hospital Chief/Director					
A.11.2	Senior Administrative Officer					

B. Enumerator data

B.1. Date of interview / / B.2. Time started : B.3. Time completed :
 D D M M Y Y

B.4 Total time: :

B.4. Interviewer ID B.5. Interviewer signature

C. Instrument review

C.1. Field supervisor: review date / / C.1.1 Field Supervisor signature
 DD/MM/YY

C.2. Editor: review date / / C.2.1 Editor signature
 DD/MM/YY

C.3. Data encoder entry date / / C.3.1 Encoder signature
 DD/MM/YY

C.4. 2nd data encoder entry date / / C.3.1 2nd encoder signature
 DD/MM/YY

D. Informed consent

The Quality Improvement Demonstration Study (QIDS) Evaluation of the Health Sector Reform Agenda (EHRSA) is a four year project supported by the US National Institutes of Health. The partner institutions in the Philippines are the Department of Health, PhilHealth, the University of California, San Francisco, and the UPEcon Foundation. The purpose of the survey is to learn how new government policies for insurance and provider payment systems might affect the health of Filipino children.

You have been selected to give us information to help us complete the facility questionnaire. This facility survey will inquire about the services available at your health facility including your staff, equipment, supplies and costs. To obtain more accurate information, we may need to interview more than one person. If during the interview we ask you questions that you cannot answer but someone else can, please refer us to that other person.

Please be assured that the information you provide will be treated with the utmost confidentiality and will not be shared with anyone including your staff. This information will be used for research purposes only. Your name and other personal information will eventually be removed from the questionnaire and only a code number will connect your name with your answers. Specifically we want to say that this information will not be used for disciplinary action or regulation.

We hope that the information will indirectly benefit you by informing the Department of Health of the problems within the public health sector so that they can make changes to improve the quality of health services in the hospital. The only cost to you in terms of participation is your time in completing the survey.

If there is a question you do not want to answer, just tell me and we will skip to the next one; if you no longer want to continue, you can also tell me and we will stop the interview. If you have any questions, you can ask me, or you can contact our survey supervisor Laurie Ramiro through Romy Marcaida at (02) 525-4098. You can also contact Stella Quimbo at the UPEcon Foundation at (02) 920-5461.

Your signature indicates that you understood the purpose and mechanics of this study and that you are willing to participate.

Who read this consent form?					
Respondent 1	Read by respondent	1	Respondent 2	Read by respondent	1
	Read by interviewer	2		Read by interviewer	2

Signature of respondent 1	Signature of respondent 2
Date: __ __ / __ __ / __ __	Date: __ __ / __ __ / __ __
DD MM YY	DD MM YY
Signature of interviewer	Signature of interviewer

E. General Information

A26

E1 What year was this hospital opened? _____

E1.1 What year was the last major renovation completed? _____

E2	What municipalities does this hospital serve? <i>(Municipality name)</i>	What is the population of each municipality? <i>(Population)</i>

E21 _____ **E211** _____

E22 _____ **E221** _____

E23 E231

E24 _____ **E241** _____

E25 E251

E26 _____ E261 _____

E27 _____ **E271** _____

E28 _____ E281 _____

E3 How many DOH licensed beds does this hospital have?

E4 How many beds can actually be used for patients at this time?

E5 Is this hospital PhilHealth accredited? Yes..... 1
No(Skip to E7).... 2

E6 If yes, what year was the hospital first given PhilHealth accreditation?

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E7 Is this hospital Sentrong Singla accredited? Yes..... 1
No(Skip to E9) 2

E8 If yes, what year was the hospital first given Sentrong Sigla accreditation? _____

E9	What are the departments in this hospital?		
		(Circle all that apply)	
E.9.1	Clinical Services Department.....		1
E.9.2	Medicine.....		2
E.9.3	OB-Gyn.....		3
E.9.4	Pediatrics.....		4
E.9.5	Surgery.....		5
E.9.6	Psychiatry.....		6
E.9.7	Pathology.....		7
E.9.8	Laboratory.....		8
E.9.9	OPD.....		9
E.9.10	Emergency.....		10
E.9.11	Mortuary.....		11
E.9.12	ICU.....		12
E.9.13	Administrative Services.....		13
E.9.14	Others (specify)_____		14
E.9.99	Not departmentalized.....		99

E.10 Does the hospital have the following committees or bodies..... *(Read list and circle all that apply)*

E.10.1	Quality assurance/review committee.....	1
E.10.2	Morbidity and mortality conference or committee.....	2
E.10.3	Medical Staff or Executive committee.....	3
E.10.4	Infection control committee.....	4
E.10.5	Pharmacy or therapeutics committee.....	5

F. Hospital Management

F1. What is the plantilla for this hospital? Please write in the number of positions funded by the hospital budget, seconded, filled and vacant

Position	A # of positions funded	B # seconded from other sources	C # full time positions	D # part-time positions	E # of positions filled	F # of positions vacant
F.1.1 Hospital chief	---	---	---	---	---	---
F.1.2 Deputy chief	---	---	---	---	---	---
F.1.3. Other Administrative	---	---	---	---	---	---
F.1.4 Residents/Fellows/Interns	---	---	---	---	---	---
F.1.5 Doctors/Consultants (by type)						
F.1.5.1 General Doctors	---	---	---	---	---	---
F.1.5.2 Pediatrics	---	---	---	---	---	---
F.1.5.3 Internal Medicine	---	---	---	---	---	---
F.1.5.4 Surgery	---	---	---	---	---	---
F.1.5.5 OB/GYN	---	---	---	---	---	---
F.1.5.6 Anesthesiology	---	---	---	---	---	---
F.1.5.7 Pathology	---	---	---	---	---	---
F.1.5.8 Other specialists Specify: _____	---	---	---	---	---	---
F.1.6 Midwives	---	---	---	---	---	---
F.1.7 Chief Nurse	---	---	---	---	---	---
F.1.8 Nurses	---	---	---	---	---	---
F.1.9 Nutritionists	---	---	---	---	---	---
F.1.10 Psychologists	---	---	---	---	---	---
F.1.11 Dentist	---	---	---	---	---	---
F.1.12 Med techs	---	---	---	---	---	---
F.1.13 Social workers	---	---	---	---	---	---
F.1.14 Pharmacists	---	---	---	---	---	---
F.1.15 X-ray technician	---	---	---	---	---	---
F.1.16 Lab technician	---	---	---	---	---	---

F.1.17 Phisiotherapist/Physical therapist	---	---	---	---	---	---
F.1.18 Billing/accounting staff	---	---	---	---	---	---
F.1.19 Utility workers	---	---	---	---	---	---
F.1.20 Other, specify _____	---	---	---	---	---	---

Now I'd like more detailed information about all of the doctors that work full or part time in this facility. Please help me complete the following table with information about each doctor.
The chief of hospital should be listed in line 1

F2	Physician Roster	A Worked anytime in 24 hrs last Wed.?	B Specialty (see codes)	C Age	D Gender	E Hospital Salary (monthly)	F Has private practice?
	Name	Yes.....1 No.....2					Yes.....1 No.....2
1	_____	Yes.....1 No.....2	---	---	---	-----	Yes.....1 No.....2
2	_____	Yes.....1 No.....2	---	---	---	-----	Yes.....1 No.....2
3	_____	Yes.....1 No.....2	---	---	---	-----	Yes.....1 No.....2
4	_____	Yes.....1 No.....2	---	---	---	-----	Yes.....1 No.....2
5	_____	Yes.....1 No.....2	---	---	---	-----	Yes.....1 No.....2
6	_____	Yes.....1 No.....2	---	---	---	-----	Yes.....1 No.....2
7	_____	Yes.....1 No.....2	---	---	---	-----	Yes.....1 No.....2
8	_____	Yes.....1 No.....2	---	---	---	-----	Yes.....1 No.....2
9	_____	Yes.....1 No.....2	---	---	---	-----	Yes.....1 No.....2
10	_____	Yes.....1 No.....2	---	---	---	-----	Yes.....1 No.....2

		Yes.....1						Yes.....1	A28
11	_____	No.....2	___	___	___	___	___	No.....2	
		Yes.....1						Yes.....1	
12	_____	No.....2	___	___	___	___	___	No.....2	
		Yes.....1						Yes.....1	
13	_____	No.....2	___	___	___	___	___	No.....2	
		Yes.....1						Yes.....1	
14	_____	No.....2	___	___	___	___	___	No.....2	
		Yes.....1						Yes.....1	
15	_____	No.....2	___	___	___	___	___	No.....2	
		Yes.....1						Yes.....1	
16	_____	No.....2	___	___	___	___	___	No.....2	
		Yes.....1						Yes.....1	
17	_____	No.....2	___	___	___	___	___	No.....2	
		Yes.....1						Yes.....1	
18	_____	No.....2	___	___	___	___	___	No.....2	

Specialty Codes:		
GENERAL PRACTICE.....1	DERMATOLOGY.....8	PATHOLOGY.....16
FAMILY PRACTICE.....2	CARDIOLOGY.....9	ONCOLOGY.....17
INTERNAL MEDICINE.....3	PSYCHIATRY.....10	ANESTHESIOLOGY.....18
SURGERY.....4	GASTROENTEROLOGY.....11	RADIOLOGY.....19
OBSTETRICS/GYNECOLOGY.....5	PULMONOLOGY.....12	PUBLIC HEALTH.....20
PEDIATRICS.....6	OPHTHALMOLOGY.....13	ENDOCRINOLOGY.....21
EAR, NOSE, AND THROAT.....7	SOCIAL MEDICINE.....14	DENTISTRY.....22
	EPIDEMIOLOGY.....15	TRAUMATOLOGY.....23

Next I'd like to know more about the background of the chief of hospital...

(This section must be asked of the chief. If the chief is unavailable now, schedule him or her for later.)

F.3 What is your (the hospital chief's) highest educational degree earned? _____

F.4 Did this education include any courses specifically on hospital management? . Yes.....1
No.....2

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F.5 Have you had any other continuing education courses specifically on hospital management? Yes..... 1
No..... 2

F.6 How many years have you (the hospital chief) worked as chief of this hospital?

F.7 How long have you served as chief of any hospital?

F.8 **How would you rate your leadership in this hospital?** *(Read list and circle one)*

Excellent..... 1
Very Good..... 2
Good..... 3
Fair..... 4
Poor..... 5

F.9 **How do you think the doctors would rate your leadership?** *(Read list and circle one)*

Excellent.....	1
Very Good.....	2
Good.....	3
Fair.....	4
Poor.....	5

F.10 How do you think the patients would rate your leadership? *(Read list and circle one)*

Excellent.....	1
Very Good.....	2
Good.....	3
Fair.....	4
Poor.....	5

G. Implementation of Interventions

A29

G1 Have you heard of the Health Sector Reform Agenda or HSRA? Yes.....1
No..... 2

G2 Are there any HSRA activities being carried out in your interlocal health zone
(including your district hospital)? Yes..... 1
No(Skip to G3).... 2

G.2.1 What are these activities? _____

G.3 Are there any HSRA activities being carried out elsewhere in your province? Yes..... 1
No(Skip to G4).... 2

G.3.1 What are these activities? _____

G.4 Are you currently participating in any capitation arrangements at the district hospital level? Yes.....1
No..... 2

G.5 Are you participating in a program that includes a special coverage for children under 5? Yes..... 1
No(Skip to G6).... 2

G.5.1 If so, how many children are enrolled in this special coverage in your district? _____

G.5.2 When did the hospital first receive payments under this program? _____
(DD/MM/YY)

G.5.3 What is the average length of time between payments? (in months) _____

G.6 Are you participating in a program that gives bonuses based on measures of quality of care? Yes..... 1
No(Skip to G7).... 2

G.6.1 If so, how many physicians qualified for the quality payment incentive? _____

G.6.2 How many of the physicians who work in this facility have received the quality payment incentive? _____

G.6.3 How many patients completed and submitted a satisfaction questionnaire in the last month?
(Verify answer by asking to see completed forms) (If none skip to G.6.4) _____

G.6.4 What is your average satisfaction score, this past month? _____

G.6.5 How many random chart reviews were done last month to monitor medical staff compliance with quality standards? _____

G.6.6 When did the hospital first receive bonus payments under this scheme? _____
(DD/MM/YY)

G.6.7 What is the average length of time between bonus payments? (in months) _____

G.7 Are you participating in the PhilHealth Indigent program? Yes..... 1
No(Skip to H1) 2

G.7.1 How many PhilHealth Indigent Members did you serve last year? _____

G.7.2 When did the hospital first receive reimbursements for charges incurred by PhilHealth Indigent members? _____
(DD/MM/YY)

G.7.3 What is the average length of time between submission of a claim and payment by PhilHealth for indigent care? (in months)

H. Patient Load and Mix

This section should be completed while looking through patient logs for the hospital. If hospital records are not kept to this level of detail, give them a tally sheet and ask them to track it for one month.

Outpatients/OPD

H.1 In the past month, how many outpatient (OPD) visits did the hospital have?

H.2 Of these OPD visits, how many were for pre-natal care?

H.3 Of these OPD visits, how many were for immunizations only?

H.4 Of these OPD visits, how many were for pediatric care?

H.5 Last week, how many total hours were your outpatient clinics open...

H.5.1 for all patients?

H.5.2 for pediatric patients?

H.6 Last week, how many total hours was your emergency room open for treating/admitting ...

H.6.1 for all patients?

H.6.2 for pediatric patients?

H.7 Of the total OUTPATIENTS in the past month, how many were:

H.7.1 children less that 6 months old

H.7.2 children 6-11 months old

H.7.3 children 12-23 months old
(1 to less than 2 years old)

H.7.4 children 24-35 months old
(2 to less than 3 years old)

H.7.5 children 36-47 months old
(3 to less than 4 years old)

H.7.6 children 48-59 months old
(4 to less than 5 years old)

H.7.7 children 60-71 months old
(5 to less than 6 years old)

H.7.8 children 72-83 months old
(6 to less than 7 years old)

H.7.9 children 84-95 months yrs old
(7 to less than 8 years old)

H.7.10 children 96-107 months old
(8 to less than 9 years old)

H.7.11 pregnant women

H.8 Of the total OUTPATIENTS in the past month, how many were:

- H.8.1 Charity cases (zero payments)_____
- H.8.2 PhilHealth Indigent Program members/dependents_____
- H.8.3 PhilHealth Regular Program members/dependents_____
- H.8.4 Private Insurance members/dependents_____
- H.8.5 Community Health Insurance Program members/dependents_____
- H.8.6 Pay patients (without third party payment arrangements)_____

Inpatients

- H.9 In the past month, how many TOTAL admissions did the hospital have?_____
- H.10 Of the admissions in the past month, how many of the total admissions were admitted to the following departments?

H.10.1 Internal Medicine_____

H.10.2 OB-Gyn_____

H.10.3 Pediatrics_____

H.10.4 Surgery_____

H.10.5 Psychiatry_____

H.10.99 Not Departmentalized_____

H.11 Of the total INPATIENTS in the past month, how many were:

- H.11.1 children less that 6 months old_____
- H.11.2 children 6-11 months old_____
- H.11.3 children 12-23 months old
(1 to less than 2 years old)_____
- H.11.4 children 24-35 months old
(2 to less than 3 years old)_____
- H.11.5 children 36-47 months old
(3 to less than 4 years old)_____
- H.11.6 children 48-59 months old
(4 to less than 5 years old)_____
- H.11.7 children 60-71 months old
(5 to less than 6 years old)_____
- H.11.8 children 72-83 months old
(6 to less than 7 years old)_____
- H.11.9 children 84-95 months yrs old
(7 to less than 8 years old)_____
- H.11.10 children 96-107 months old
(8 to less than 9 years old)_____
- H.11.11 pregnant women_____

H.12 Of the total INPATIENT pediatric patients in the past month, how many were:

H.12.1 Pneumonia cases
(acute lower respiratory tract infection)_____

H.12.2 Diarrhea (acute gastroenteritis) cases_____

H.12.3 Urinary tract infections_____

H.13 Of the total number of inpatients in the past month, how many occupied:

H.13.1 Charity ward_____

check here if the facility does not have a charity ward ☐

H.13.2 Pay ward_____

check here if the facility does not have a pay ward ☐

H.13.3 Medicare ward_____

check here if the facility does not have a Medicare ward ☐

H.13.4 Others (specify)_____

H.14 Thinking of the overall patient load in an average year, what is the percentage breakdown for the following categories

H.14.1 OPD _____ %

H.14.2 Inpatient _____ %

Within OPD

H.14.1.1 Prenatal care _____ %

H.14.1.2 Immunization only _____ %

H.14.1.3 Pediatric cases _____ %

H.14.1.4 Other _____ %

I. Medical Equipment

	How many of the following medical equipment are found in this hospital?	How many of the following are in good/working condition today?
I.1.1 Microscope	<div></div>	I.1.2 <div></div>
I.2.1 Centrifuge	<div></div>	I.2.2 <div></div>
I.3.1 X-ray	<div></div>	I.3.2 <div></div>
I.4.1 Ultrasound	<div></div>	I.4.2 <div></div>
I.5.1 Adult ventilator	<div></div>	I.5.2 <div></div>
I.6.1 Child ventilator	<div></div>	I.6.2 <div></div>
I.7.1 Pulse Oximeter	<div></div>	I.7.2 <div></div>
I.8.1 Cardiac Monitor	<div></div>	I.8.2 <div></div>
I.9.1 Incubator	<div></div>	I.9.2 <div></div>
I.10.1 Warming bed for newborns	<div></div>	I.10.2 <div></div>
I.11.1 Electrocardiogram	<div></div>	I.11.2 <div></div>
I.12.1 Echocardiogram	<div></div>	I.12.2 <div></div>
I.13.1 Defibrillator	<div></div>	I.13.2 <div></div>
I.14.1 Anesthesia machine	<div></div>	I.14.2 <div></div>
I.15.1 Operating room table	<div></div>	I.15.2 <div></div>
I.16.1 Operating room lamp	<div></div>	I.16.2 <div></div>
I.17.1 Cautery machine	<div></div>	I.17.2 <div></div>
I.18.1 Casting equipment	<div></div>	I.18.2 <div></div>
I.19.1 Oxygen delivery	<div></div>	I.19.2 <div></div>
I.20.1 Nebulizer	<div></div>	I.20.2 <div></div>

J. Medical Instruments

I.21.1 Backup generator

☐

I.21.2

☐

A33

How many of the following medical instruments are found in this hospital?

J.1.1 Sterilizer

J.2.1 Baby scale

J.3.1 IV tubing

J.4.1 Regular stethoscope

J.5.1 Otoscope

J.6.1 Resuscitation equipment (bad, mask, and oxygen)

J.7.1 Suturing sets

J.8.1 Sterile disposable latex gloves

☐

☐

☐

☐

☐

☐

☐

☐

How many of the following medical instruments are in good/working condition today?

J.1.2

J.2.2

J.3.2

J.4.2

J.5.2

J.6.2

J.7.2

☐

☐

☐

☐

☐

☐

☐

K. Laboratory Services

Do you perform the following laboratory tests in this hospital?

K.1 Urinalysis

Yes.....1

No.....2

K.2 Fecalysis

Yes.....1

No.....2

K.3 CBC

Yes.....1

No.....2

K.4 Blood typing

Yes.....1

No.....2

K.5 Gram stain

Yes.....1

No.....2

K.6 TB sputum stain

Yes.....1

No.....2

K.7 Serum glucose levels

Yes.....1

No.....2

K.8 Serum creatinine test

Yes.....1

No.....2

K.9 Electrolytes (sodium, potassium)

Yes.....1

No.....2

K.10 VDRL or RPR test

Yes.....1

No.....2

K.11 Liver function tests

Yes.....1

No.....2

K.12 Hepatitis B test

Yes.....1

No.....2

K.13 Bacterial culture

Yes.....1

No.....2

L. Supplies

L. Looking at the supplies you have on hand today, does this hospital have a supply of the following items?

- L.1

Antiseptics

Yes.....1
No.....2
- L.2

Bandages

Yes.....1
No.....2
- L.3

Oxygen tank

Yes.....1
No.....2
- L.4

Suturing materials

Yes.....1
No.....2
- L.5

IV tubes

Yes.....1
No.....2
- L.6

Gloves

Yes.....1
No.....2
- L.7

Gram stain

Yes.....1
No.....2
- L.8

Acid fast

Yes.....1
No.....2
- L.9

Pregnancy test strips

Yes.....1
No.....2
- L.10

Urine strip

Yes.....1
No.....2

- L.11

VDRL serology

Yes.....1
No.....2
- L.12

Test for occult blood in stool

Yes.....1
No.....2

M. Medications prescribed

M. Looking at the prescriptions you have filled in the past week, how many have you filled for?

- M.1

Penicillin

- M.2

Ampicillin or Amoxicillin

- M.3

Erythromycin

- M.4

Tetracycline/ Macrolide

- M.5

Chloramphenicol

- M.6

Cotrimoxazole (Bactrim or Septra)

- M.7

Metronidazole

- M.8

Aminoglycosides

- M.9

Cephalosporins

- M.10

Quinolones

- M.11

Oral rehydration salts or solution

- M.12

Paracetamol (acetaminophen)

M.13	Oral Contraceptives	_____	<u>A35</u>
M.14	Injectable Contraceptives	_____	
M.15	IUD	_____	
M.16	Condoms	_____	
M.17	INH	_____	
M.18	Rifampicin	_____	

N. Administrative and Ancillary Services

N.1	Does the hospital have a functioning computerized system for tracking or organizing medical records?	Yes.....1 No.....2
N.2	Does it have a functioning computerized system for laboratory results?	Yes.....1 No.....2
N.3	Does it have a functioning computerized system for billing patients?	Yes.....1 No.....2
N.4	Does it have a functioning computerized system for tracking expenditures?	Yes.....1 No.....2
N.5	Does it have a functioning computerized system for tracking costs?	Yes.....1 No.....2
N.6	Does it have a functioning computerized system for paying staff?	Yes.....1 No.....2

N.7	Does It have a functioning computerized system for drug inventory?	Yes.....1 No.....2
N.8	Does It have a functioning computerized patient medical record system ?	Yes.....1 No.....2
N.9	Are you able to pull out a patient chart based on name or date of confinement? (If yes, ask for demonstration and check here if successfully completed)	Yes.....1 No.....2
N.10	Are you able to pull-out a patient chart for any patient under 5 years old who had either Acute Gastroenteritis or Pneumonia last month? (If yes, ask for demonstration and check here if successfully completed)	Yes.....1 No.....2
N.11	Are you able to pull-out a patient chart for any patient whose charges were billed against the PhilHealth Indigent Program in the last six months? (If yes, ask for demonstration and check here if successfully completed)	Yes.....1 No.....2
N.12	Does this hospital have a pharmacy?	Yes.....1 No.....2
N.13	How many hours was the pharmacy open last Wednesday?	_____
N.14	During the day last Wednesday, how many hours was the pharmacy closed for breaks?	_____
N.15	Are there any private pharmacies within 200 meters from the hospital?	Yes..... 1 No...(Skip to Section O) .. 2
N.16	If there is more than one, select the one with the longest hours... If yes, how many hours was this pharmacy open last Wednesday?	_____

O. Source of Hospital Funds (This should be done while reviewing hospital financial records)

A36

- O.1

How much did the provincial government allocate for this hospital last year?

_____ pesos
- O.2

How much did the municipal/city government allocate for this hospital last year?

_____ pesos
- O.3

How much were hospital revenues from user charges last year?

_____ pesos
- O.4

How much were revenues from non-patient sources (rental, canteen etc)?

_____ pesos
- O.5

How much PhilHealth reimbursements did this hospital receive last year?

_____ pesos
- O.6

How much cash grants and donations did this hospital receive last year?

_____ pesos
- O.7

Did this hospital receive grants or donations in kind last year?

Yes..... 1

No...(Skip to O8) . 2

If yes, were these in the form of:

(Circle all that apply)

- O.7.1

Drugs.....

1
- O.7.2

Medical Equipment.....

2
- O.7.3

Civil Works.....

3
- O.7.4

Medical Missions.....

4
- O.7.5

Others (specify)_____

5

- O.8

In the past year, did the hospital undertake activities to generate additional resources?

Yes..... 1

No(Skip to O.12)..... 2

- O.9

If yes, what were these activities?

O.9.1

Grants.....

1

O.9.2

Loans.....

2

O.9.3

Community-based fundraising activities...

3

O.9.4

Others (specify)_____

4
- O.10

How many pesos were raised as a result of these resources?

_____ pesos
- O.11

For gifts given in kind (not income) what was the value of these?

_____ pesos
- O.12

What was the total annual operating budget of this facility last year?

_____ pesos
- O.13

What is the cummulative debt of this facility?

_____ pesos
- O.14

Have you experienced any delays in receiving the budget allocated to you by the province?

Yes..... 1

No..... 2
- O.15

Have you experienced any delays in receiving the budget allocated to you by the municipalities?

Yes..... 1

No..... 2

P. Uses of Hospital Funds

Last year, how much did this hospital spend on

- P.1

PS (Personnel Services)

P1.1

Salaries, allowances and wages for medical staff

_____ pesos

P1.2

Salaries, allowances and wages for non-medical staff

_____ pesos

P.1.3

Retirement payments

_____ pesos
- P.2

MOOE (Maintenance and operating expenditures)

P.2.1

Drugs

_____ pesos

	P.2.2	Medical supplies	_____, _____, _____	pesos <u>A37</u>
	P.2.3	Utilities (water and electricity)	_____, _____, _____	pesos
	P.2.4	Transportation and travel	_____, _____, _____	pesos
	P.2.5	Communications	_____, _____, _____	pesos
	P.2.6	Foodstuffs and linen	_____, _____, _____	pesos
	P.2.7	Other MOOE (cleaning supplies, etc)	_____, _____, _____	pesos
	P.3	Capital Expenditures		
	P.3.1	Construction of a new building	_____, _____, _____	pesos
	P.3.2	Repair of existing building	_____, _____, _____	pesos
	P.3.3	Equipment repair	_____, _____, _____	pesos
	P.3.4	Equipment procurement	_____, _____, _____	pesos
	P.3.5	Other capital expenditures	_____, _____, _____	pesos

Q. Hospital Fee Policy

Q What are the fees charged for the following types of service in this hospital by type of insurance?

	1 PhilHealth Indigent Program	2 PhilHealth Regular Program	3 Private Insurance	4 Community Health Insurance Program	5 Self-financing
Q.1. Initial outpatient visit					
Q.2. Follow-up outpatient visit					
Q.3. Outpatient specialist visit					
Q.4. Inpatient admission					
Q.5. Inpatient consult (genl)					
Q.6. Inpatient specialist consult					
Q.7. Normal Delivery					

Q.8	C-section					
Q.9	Basic suturing					
Q.10	X-ray					
Q.11	Bacterial Gram stain					
Q.12	TB sputum exam					
Q.13	Amoxicillin					
Q.14	Complete Immunization Package					
Q.15	Pediatric Outpatient visit					
Q.16	Pediatric Inpatient evaluation					
Q.17	Daily IV charge					
Q.18	CBC					
Q.19	ORS					

A38

Q What percent of the fees charged are actually paid for the following types of service in this hospital by type of insurance?

	1 PhilHealth Indigent Program	2 PhilHealth Regular Program	3 Private Insurance	4 Community Health Insurance Program	5 Self-financing
Q.20 All outpatient visits	_____ %	_____ %	_____ %	_____ %	_____ %
Q.20 All Inpatient evaluations	_____ %	_____ %	_____ %	_____ %	_____ %
Q.21 Normal Delivery	_____ %	_____ %	_____ %	_____ %	_____ %
Q.22 C-section	_____ %	_____ %	_____ %	_____ %	_____ %
Q.23 X-ray, sonogram and other Imaging studies	_____ %	_____ %	_____ %	_____ %	_____ %
Q.24 Laboratory tests	_____ %	_____ %	_____ %	_____ %	_____ %
Q.25 Amoxicillin	_____ %	_____ %	_____ %	_____ %	_____ %
Q.26 Pediatric Outpatient visit	_____ %	_____ %	_____ %	_____ %	_____ %

Q.27

Pediatric Inpatient evaluation

%

%

%

%

%

Q.28

Daily IV charge

%

%

%

%

%

R. Enumerator's Observation

During the course of the day, away from the presence of the hospital chief ASK any ONE randomly chosen doctor, any ONE randomly chosen nurse and any ONE randomly chosen non-medical staff person the following question and record their answers in the appropriate space.

R.1 How would you rate the hospital chief's overall effectiveness in running this hospital? (Read list and circle one)

R.1.1

Any doctor's response
(How would you rate the hospital chief's overall effectiveness in running this hospital?)

Excellent...1

Very Good.2

Good.....3

Fair.....4

Poor.....5

R.1.2

Any nurse's response
(How would you rate the hospital chief's overall effectiveness in running this hospital?)

Excellent...1

Very Good 2

Good.....3

Fair.....4

Poor.....5

R.1.3

Any non-medical staff's response
(How would you rate the hospital chief's overall effectiveness in running this hospital?)

Excellent...1

Very Good.2

Good.....3

Fair.....4

Poor.....5

The following questions should be answered based on your observations made during your stay at the facility on the day you complete the facility instrument. You may have to ask the staff to let you see certain areas, but except where otherwise noted these answers must based on direct observations rather than on answers supplied by hospital staff.

R.2 Condition of the General Examination Room

R.2.1

What is the condition of the floor?
(dirty=bits of paper, trash, dust, liquid on the floor)

(Circle one)

Dirty.....1

Somewhat dirty....2

Somewhat clean.. 3

Clean.....4

R.2.2

What is the condition of the walls?
(dirty=spiderwebs, dirt, chipped paint, moisture, stains)

(Circle one)

Dirty.....1

Somewhat dirty....2

Somewhat clean.. 3

Clean.....4

R.2.3

Is there a curtain that encloses the examination room
(i.e., separates it from other areas)?

(Circle one)

Yes.....1

No.....2

R.2.4 Is there a place in the outpatient exam room where the doctor can wash his or her hands?

A40

(Circle one)
Sink with running water.... 1
Basin with liquid..... 2
Nothing..... 3

R.2.5 Is there an examination bed for patients in the majority of outpatient exam rooms?

(Circle one)
Yes..... 1
No..... 2

R.3 Laboratory

R.3.1 Is there a laboratory in this facility? (please proceed to see it)

(Circle one)
Yes..... 1
No...(Skip to R.5) 2

R.3.2 What is the condition of the laboratory floor?
(dirty=bits of paper, trash, dust, liquid on the floor)

(Circle one)
Dirty..... 1
Somewhat dirty.... 2
Somewhat clean.. 3
Clean..... 4

R.3.3 What is the condition of the laboratory walls?
(dirty=spiderwebs, dirt, chipped paint, moisture, stains)

(Circle one)
Dirty..... 1
Somewhat clean.. 3
Clean..... 4

R.3.4 Is there a place to wash one's hands in the laboratory area?

(Circle one)
Sink with running water.... 1
Basin with liquid..... 2
Nothing..... 3

R.3.5 Is there a special trashcan in the lab for disposing of biological specimens?
(Blood, urine, etc)

(Circle one)
Yes..... 1
No..... 2

R.3.6 Is water continuously available in the laboratory during clinic hours?

(Circle one)
Yes..... 1
No..... 2

R.3.7 Is there an up-to-date log or book where laboratory results are recorded?

(Circle one)
Yes..... 1
No..... 2

R.3.8 Is there an up-to-date maintenance log or book that lists all of the laboratory equipment?

(Circle one)
Yes..... 1
No..... 2

R.4 Pediatric Ward

R.4.1 What is the condition of the floor? (dirty=bits of paper, trash, dust, liquid on the floor)

(Circle one)
Dirty..... 1
Somewhat dirty.... 2
Somewhat clean.. 3
Clean..... 4

R.4.2 What is the condition of the walls?
(dirty=spiderwebs, dirt, chipped paint, moisture, stains)

A41

(Circle one)
Dirty..... 1
Somewhat dirty....2
Somewhat clean.. 3
Clean.....4

R.4.3 Is there space for visiting family members? (chairs, etc)

(Circle one)
Yes..... 1
No..... 2

R.4.4 Is there a nearby place to wash one's hands?

(Circle one)
Sink with running water.... 1
Basin with liquid..... 2
Nothing..... 3

R.4.5 Is there at least one bed per patient?

(Circle one)
Yes..... 1
No..... 2

R.4.6 Is there a mattress for each bed?

(Circle one)
Yes..... 1
No..... 2

R.4.7 What is the condition of the area around the ward?

(Circle one)
Dirty..... 1
Somewhat dirty....2
Somewhat clean.. 3
Clean.....4

R.5 Kitchen

R.5.1 What is the condition of the floor? (dirty=bits of paper, trash, dust, liquid on the floor)

(Circle one)
Dirty..... 1
Somewhat dirty....2
Somewhat clean.. 3
Clean.....4

R.5.2 What is the condition of the walls?
(dirty=spiderwebs, dirt, chipped paint, moisture, stains)

(Circle one)
Dirty..... 1
Somewhat dirty....2
Somewhat clean.. 3
Clean.....4

R.5.3 Is there a nearby place to wash one's hands?

(Circle one)
Sink with running water.... 1
Basin with liquid..... 2
Nothing..... 3

R.5.4 What is the condition of the area around the kitchen?

(Circle one)
Dirty..... 1
Somewhat dirty....2
Somewhat clean.. 3
Clean.....4

D. Consent (Read)

A43

Dear Dr _____,

The Quality Improvement Demonstration Study (QIDS) EHSRA is a four-year project supported by the U.S. National Institutes of Health. The partner institutions in the Philippines are the Department of Health, PhilHealth, the University of California San Francisco and the UPEcon Foundation. The primary objective of this study is to determine the effectiveness of certain health policy interventions on the health status of children. The project will focus on children and diseases of childhood.

It is with great pleasure we inform you that you have been selected to participate in this study. Specifically, we would like to know your opinions and experiences as health provider of this facility. The interview will take about one and a half hours. The information that you will provide will be treated with utmost confidentiality. The data will be used for research purposes only. Your name or address and other personal information will eventually be deleted from the questionnaire and only a code or number will connect your name with your answers. After you complete the questionnaire we will give you the vignettes. These are paper cases. You will be asked to care for these patients as you would care for children in your own practice. They take 10-20 minutes each to complete.

Your participation is voluntary. You may refuse to answer any question which you consider sensitive or confidential. If you have any questions, you can ask me or can contact our survey supervisor Laurie Ramiro at UP Manila through Romy Marcaida at 02-525-4098. You may also contact Stella Quimbo at the Upecon Foundation at (02) 920-5461.

Your signature indicates that you understood the purpose and mechanics of this study and that you are willing to participate in this endeavor.

D1. Signature of respondent _____

Signature of interviewer _____

Date: DD / MM / YY

Did respondent...
Consent and sign?
Consent but not sign?
Refuse to participate?

Let me begin with a few questions asking about you...

D.2 Have you participated in previous interviews with our study team which included completing paper cases or vignettes?

Yes (Go to D3)..... 1
No (Go to Section E).....2

D.3 When were you last interviewed for this study?

DD / MM / YY

D.4 At that time, were you practicing in this facility?

Yes (Skip to E.6)..... 1
No.....2

D.4.1 If no, which facility?

E. General Information

E.1 How old are you?

_____ years

E.2 Gender (Observe)

Male..... 1
Female..... 2

E.3.1 Where did you earn your medical degree?

3.1.1 Medical school in Metro Manila..... 1
3.1.2 Local medical schools in Visayas.....2
3.1.3 Other Medical schools in the Philippines.....3
3.1.4. US/UK4
3.1.5. Asian medical schools..... 5
3.1.6. Others..... 6

E.3.2 When did you graduate from medical school?

MMYYA44

E.4.1 After your medical degree, did you undergo specialty or subspecialty training?

Yes (go to E.4.2)... 1

No (Go to E.6)..... 2

E.4.2 In what specialty have you received training?

Circle all that apply

4.2.1

GENERAL PRACTICE.....

1

4.2.2

FAMILY PRACTICE

2

4.2.3

INTERNAL MEDICINE.....

3

4.2.4

SURGERY.....

4

4.2.5

OBSTETRICS/GYNECOLOGY....

5

4.2.6

PEDIATRICS.....

6

4.2.7

EAR, NOSE, AND THROAT.....

7

4.2.8

DERMATOLOGY.....

8

4.2.9

CARDIOLOGY.....

9

4.2.10

PSYCHIATRY.....

10

4.2.11

GASTROENTEROLOGY.....

11

4.2.12

PULMONOLOGY.....

12

4.2.13

OPHTHALMOLOGY

13

4.2.14

SOCIAL MEDICINE.....

14

4.2.15

EPIDEMIOLOGY.....

15

4.2.16

PATHOLOGY.....

16

4.2.17

ONCOLOGY.....

17

4.2.18

ANESTHESIOLOGY.....

18

4.2.19

RADIOLOGY.....

19

4.2.20

PUBLIC HEALTH.....

20

4.2.21

ENDOCRINOLOGY.....

21

4.2.22

DENTISTRY.....

22

4.2.23

TRAUMATOLOGY.....

23

4.2.24

Other specify: _____

24

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E.4.3. Was your specialty training in a program affiliated with a medical school?

Yes..... 1

No (Skip to E.4.5)..... 2

E.4.4 Where did you do specialty medical training?

4.4.1

Medical school in Metro Manila.....

1

4.4.2

Local medical schools in Visayas.....

2

4.4.3

Other Medical schools in the Philippines.....

3

4.4.4.

US/UK

4

4.4.5.

Asian medical schools.....

5

4.4.6.

Others.....

6

E.4.5 How many months was your specialty training?

Months

E.5 Status in Specialty society

Not a member 1

Associate member2

Diplomate 3

Fellow 4

E.6 When was the last continuing medical education activity that you attended ?

Please include all seminars or refresher courses that were 3 days or longer

< 1 year ago 1

1-2 years ago 2

3-5 years ago 3

> 5 years ago 4

E.7Have you attended any seminar or training in the last five years on...

A45

E.7.1Evidenced -based medicine?.....

Yes.....1

No.....2

E.7.2Health technology assessment/ information technology?..

Yes.....1

No.....2

E.7.3Quality assurance?.....

Yes.....1

No.....2

E.7.4Management.....

Yes.....1

No.....2

F. Practice

F1How long have you been practicing as a physician?

years

F2How long have you been practicing as a physician in this facility?

years

F3What is your current position in this facility?

Resident.....1

General Practitioner.....2

Medical Officer.....3

Medical Specialist.....4

Consultant.....5

Chief of department.....6

Hospital Chief.....7

Other, specify _____8

F4How long have you been working in this position?

years

F5Do you hold any other professional positions or appointments?

Yes.....1

No...(Skip to F6)...2

F.5.1What types of other appointments do you hold?

Teaching faculty.....1

Hospital Administration.....2

Officer of professional society.....3

Government official.....4

Others: specify: _____5

F6Do you work in other hospitals?

Yes.....1

No.....2

If YES, tell respondent:
"In your answers to questions about your practice, please refer to your work in this district hospital or facility unless explicitly stated"

G. Practice time allocation

On average how many hours per week did you you spend on each of the following activities in the last month

G.1.1How many hours per week do you spend in clinical practice?

hours per week

Of the hours spent in clinical practice....

G.1.2how many were spent seeing INPATIENT cases?

hours per week

G.2.1How many were spent seeing OUTPATIENT cases?

hours per week

Of the hours spent seeing OUTPATIENT cases....

G.2.2How many were spent seeing new patients?

hours per week

G.2.3How many were spent with follow-up visits?

hours per week

Appendix A4

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G.3	How many hours a week do spend on administration? (e.g. budget, finance, planning, operations, personnel management)	___	___	hours per week	<u>A46</u>
G.4	How many hours a week do you spend on research and training?	___	___	hours per week	
G.5	On average, how much time would you estimate you spend on a new outpatient visit?	___	___	minutes	
G.6	On average, how much time would you estimate you spend on a follow up outpatient visit?	___	___	minutes	
G.7	On average, how much time would you estimate you spend evaluating and examining a patient admitted to the hospital?	___	___	minutes	
G.8	On average, how much time would you estimate you spend seeing an admitted patient while they are in the hospital?	___	___	minutes	

H. Case Load mix

H.1	Approximately how many OUTPATIENT patients did you attend to last month (in this facility)?	_____	_____	_____	
H.1.1	Of these, what percent were...				
	Pediatrics	_____	_____	_____	%
	OBGYN	_____	_____	_____	%
	Internal Medicine	_____	_____	_____	%
	Minor surgery	_____	_____	_____	%
	Other	_____	_____	_____	%
		<hr/>			
		1	0	0	%

H.2	Approximately how many INPATIENT patients were you personally or primarily responsible for admitting last month(in this facility)?	_____	_____	_____	
H.2.1	Of these, what percent were...				
	Pediatrics	_____	_____	_____	%
	OBGYN	_____	_____	_____	%
	Internal Medicine	_____	_____	_____	%
	Minor surgery	_____	_____	_____	%
	Other	_____	_____	_____	%
		<hr/>			
		1	0	0	%
H.3	Approximately how many INPATIENT patients were you personally or primarily responsible for attending last month(in this facility)?	_____	_____	_____	
H.3.1	Of these, what percent were...				
	Pediatrics	_____	_____	_____	%
	OBGYN	_____	_____	_____	%
	Internal Medicine	_____	_____	_____	%
	Minor surgery	_____	_____	_____	%
	Other	_____	_____	_____	%
		<hr/>			
		1	0	0	%

[illegible]

H.5	Approximately how many INPATIENT patients did you attend last month in private practice?	_____	_____	_____	
H.5.1	Of these, what percent were...				
	Pediatrics	_____	_____	_____	%
	OBGYN	_____	_____	_____	%
	Internal Medicine	_____	_____	_____	%
	Minor surgery	_____	_____	_____	%
	Other	_____	_____	_____	%

		1 0 0 %			

I. Referrals

I.1	How many referrals do you personally make in an average month TO....			
	I.1.1	A lower level facility in this district?	___	___
	I.1.2	A lower level facility in another district?	___	___
	I.1.3	Another facility licensed at the same level in this district?	___	___
	I.1.4	A facility licensed at the same level in another district?	___	___
	I.1.5	A higher level facility in this district?	___	___
	I.1.6	A higher level facility in another district?	___	___
	I.1.7	Of these referrals what percent include written correspondence TO the referral facility?	___	___ %
I.2.	How many referrals do you personally receive in an average week FROM....			
	I.2.1	Lower level facilities in this district?	___	___
	I.2.2	Lower level facilities in other districts?	___	___
	I.2.3	Facilities accredited at the same level in this district?	___	___
	I.2.4	Facilities accredited at the same level in other districts?	___	___
	I.2.5	Higher level facilities in this district?	___	___
	I.2.6	Higher level facilities in other districts?	___	___
I.2.7	Of these referrals what percent include written correspondence FROM the referring physician?	___	___	%

I.3 Thinking of the referrals you make, what % of your referrals are for the following, on the average:

1. Adult pulmonary cases%
2. Adult gastroenterology cases%
3. Other Internal medicine specialties%
4. Pediatric pulmonary cases%
5. Pediatric gastroenterology cases%
6. Other pediatric cases%
7. Surgery:%
8. OB/GYN:%
9. Psychiatry:%
10. Radiology: (evaluation)%
11. Pathology:%

I.4 Approximately what % of patients that you see each week do you order:

1. Radiology tests:%
2. Ultrasonography tests%
3. Laboratory tests:%
4. Other tests specify: %

(cat scan,mri, etc)
5. No tests at all%

I.5 Where do the radiology tests come from currently?

- X-Ray Laboratory in this hospital..... 1
- Other Public X-Ray Laboratory..... 2
- Other Private X-Ray Laboratory..... 3

I.6 What percent of laboratory tests that you order are done at this facility? %

I.7 For what lab tests that are done outside this hospital, what % do you get results in 2 days or less? %

J. Equipment, lab and facility Usage

A49

In the past month how many times have you used or ordered use of the following equipment?

J.1	IV tubing/ Infusion	___	___
J.2	X-ray	___	___
J.3	Ultrasound or Echocardiogram	___	___
J.4	Adult or child ventilator	___	___
J.5	Pulse Oximeter	___	___
J.6	Cardiac Monitor	___	___
J.7	Electrocardiogram	___	___
J.8	Otoscope	___	___
J.9	Resuscitation equipment (bad, mask, and oxygen)	___	___

K PhilHealth

K1. Do you currently receive professional fees from PhilHealth for your service in this facility?

- Yes..... 1
- No..... 2
- Don't know..... 3
- Refused.....4

K2. If so are you happy with those fees?

- Very happy..... 1
- Somewhat happy..... 2
- Neither happy nor unhappy.....3
- Somewhat unhappy..... 4
- Very unhappy..... 5
- Refused to answer 99

K3. Do you currently share the fees with other hospital staff?

- Yes..... 1
- No..... 2
- Don't know..... 3
- Refused.....4

K4. Are you happy with those sharing arrangements?

- Very happy..... 1
- Somewhat happy..... 2
- Neither happy nor unhappy.....3
- Somewhat unhappy..... 4
- Very unhappy..... 5
- Refused to answer 99

L. Income distribution by source

L.1

Compared to one year ago, has your income increased?

Yes..... 1
No (Skip to K3)..... 2

L.2

If yes, by what percentage has your income increased?

____ %

L.3

Recalling that this survey is confidential, what is your average total monthly income from all sources?
(This is a very important question. Please make every effort to collect this answer)

____ , ____ pesos
Refused to answer..... 99

A50

Thinking about your total yearly income from all sources, how much would you estimate comes from....

L.4

Your salary from working in this facility

____ , ____ pesos
Refused to answer..... 99

L.5

Salary received from working in other facilities

____ , ____ pesos
Refused to answer..... 99

L.6

Income from private practice

____ , ____ pesos
Refused to answer..... 99

L.7

Income from PhilHealth reimbursements in private or public practice

____ , ____ pesos
Refused to answer..... 99

L.8

Income from all other reimbursements including non-clinical work

____ , ____ pesos
Refused to answer..... 99

L.9

Phil Health Bonuses

____ , ____ pesos
Refused to answer..... 99

L.10

Other bonuses

____ , ____ pesos
Refused to answer..... 99

L.11

A share of a global budget made to the hospital

____ , ____ pesos
Refused to answer..... 99

END OF SURVEY SECTION. PLEASE PROCEED TO VIGNETTE IF NOT ALREADY COMPLETED.

- Attachments:
- 1. PN vignette
 - 2. AGE vignette
 - 3. Other vignette

Appendix A5: Topic guide for pharmacy screening interview, including information sheet and consent form

0. Introduction [5-10 mins]

- Introductions, establishment of rapport.
- Talk them through what the research is about, giving them the Information Sheet (i.e. objectives, contact details, what they should expect, etc).
- Stress that there is guarantee of full anonymity.
- Stress that interview is voluntary.
- Explain to interviewee nature of the interview (in particular that there aren't right or wrong answers).
- Acquire consent (signed Consent Form) before continuing.

1. Clientele [~5 mins]

Q1. On average, how many people come to your pharmacy per day (not including those purchasing toiletries, other non-medical purchases)?

Q2. What proportion came with prescriptions, as compared with over-the-counter purchases (i.e. no prescriptions)?

Q3. Of these, what proportion of your customers is referred from hospital X? (I.e. study site's public district hospital --- see also section 3)

2. Price and availability of medicines [~25 mins]

Q1. Do you offer discounts for any specific patient groups?

Probes (if needed): I.e. for indigents, elderly, prescriptions from different health facilities, those without health insurance.

Q2. At the end of the interview, I'd also like to ask you about the price and availability of these medicines [show separate Medicines Data Sheet ~20 mins]? -- do at end of interview

3. Links with study site public district hospital [~15 mins]

Q1. For how many years has the pharmacy been open?

Q2. How long have you been working here?

Q3. Do you own the pharmacy?

If NOT interviewing pharmacy owner...

- a. Who is the owner?*
- b. Does s/he also own other pharmacies?*
- c. What is this person's profession? I.e. where exactly does s/he work?*
[I.e. Find out if owner is company; individual businessman; health worker from other public or private facilities (and where these are located)]
- d. How often does the owner come to the pharmacy?*

If interviewing pharmacy owner...

- a. Do you also own other pharmacies?*
- b. Do you also have other jobs?*

Q4. How would you describe the relationship between this pharmacy and the nearby public hospital?

Probes (if needed):

- Do you have any contact with the hospital?
- Does the hospital recommend patients to come to your pharmacy?
- Do you receive many patients who have been referred from this hospital?
- How about other health facilities? I.e. do any other health facilities recommend patients here? [If yes...] Which facilities, how many patients?

4. Miscellaneous [~5 mins]

Q1. Do you have any concerns or viewpoints that you haven't had a chance to express?

- Reassurances about confidentiality, provision of my contact details.

5. Permissions

5.1 If didn't initially give answer on use of quotes, confirm now whether they do / do not agree to any individual quotes or other results arising from my interview to be reported (adjust consent form accordingly)

- Give reassurances about confidentiality and anonymity.
- Remind them of my contact details
- Thank them for their valuable contribution to this research.

5.2. Confirm permission for subsequent potential exit survey (*show them survey if necessary*).

INFORMATION SHEET [Pharmacies]

Study title: Incentives, medical effort and health service delivery: a study of Philippine health facilities.

Principal investigator: Chris James. Note that this research is done in partnership with the QIDS study team.

Contact details:

- *Email-* christopher.james@lshtm.ac.uk
- *Address in the Philippines-* c/o Orville Solon, University of Philippines Economics Foundation, Economics Building, UP Campus, Quezon City 1101, Philippines.
- *Telephone-* 09163437665 (mobile); ++63 9279686/92, 9205463 (office).

Objective of interviews: to understand a pharmacy’s relationship with other health facilities within the local health system and drug purchasing habits of pharmacy customers.

Why is your cooperation requested? Your participation will enable this study to better explore how pharmacies are integrated into the wider health system. In particular:

- (1) The interaction between pharmacies, public district hospitals and other health facilities
- (2) The kinds of patients who frequent pharmacies.
- (3) Pricing, availability and prescription practices.

What should you expect? You will be interviewed in a private environment about points (1), (2) and (3) above.

Are there any potential risks or distress? None are expected. Although the themes discussed in the interview are not expected to be discomforting, you can tell the interviewer at any time if you do not wish to answer questions / discuss particular themes.

What about anonymity and data confidentiality? Your interviews will be recorded, but these recordings will not be shared with anyone. Transcripts of your interview will be used, but these will be fully anonymised before they are included in the study. Any direct (anonymised) quotes of what you said during an interview will only be used if you consent to this.

Other information:

The Ethical Committees of the University of the Philippines and the London School of Hygiene and Tropical Medicine have approved this study.

✓ Please note that your participation in this research is entirely voluntary and your withdrawal is possible at any time, without having to give a reason.

✓ And remember, this interview is not a test! There are no right or wrong answers.

CONSENT FORM

Study title: Incentives, medical effort and health service delivery: a study of Philippine health facilities.

Principal investigator: Chris James. Note that this research is done in partnership with the QIDS study team.

Contact details:

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- *Address in the Philippines-* c/o Orville Solon, University of Philippines Economics Foundation, Economics Building, UP Campus, Quezon City 1101, Philippines.
- *Telephone-* ++44 7851046544 (mobile); ++63 9279686/92, 9205463.

I have read the information sheet concerning this study [or have understood the verbal explanation] and I understand what will be required of me and what will happen to me if I take part in it.

Any questions I have on this study have been answered by.....

I do / do not agree to participate in this study (*delete as appropriate*).

Further, I do / do not agree to any individual quotes or other results arising from my interview to be reported (*delete as appropriate*).

Print name.....

Signed.....

Date.....

Appendix A6: Medicine price and availability form

Generic name	Brand name(s)	Manufacturer	Strength / Dosage unit	Available? ("X" if yes)	Dosage unit sold to patient	Price per dosage unit	Comments
Aciclovir	Zovirax	GSK	200mg/tab				Herpes simplex virus (e.g. chickenpox, cold sores)
Other brands? / Other strengths?							
Lowest price generic equivalent	GENERIC						
Amitriptyline	Tryptizol	MSD	25mg/tab				Depression (& bedwetting)
Other brands? / Other strengths?							
Lowest price generic equivalent	GENERIC						
Amoxicillin	Amoxil	SKB (GSK)	250mg/tab				Antibiotic
	Amoxil	SKB (GSK)	500mg/tab				
Other brands? / Other strengths?							
Lowest price generic equivalent	GENERIC		250mg/tab				
Lowest price generic equivalent	GENERIC		500mg/tab				
Ampicillin	Ampicin	UNILAB	500mg/tab				Antibiotic
Other brands? / Other strengths?							
Lowest price generic equivalent	GENERIC						
Atenolol	Tenomin	AstraZeneca	50mg/tab				Beta-blocker for cardiovascular diseases (e.g. hypertension)
Other brands? / Other strengths?							
Lowest price generic equivalent	GENERIC						
Beclometasone inhaler	Becotide	GSK	0.05mg/dose				Asthma (& hayfever/sinusitis)
Other brands? / Other strengths?							
Lowest price generic equivalent	GENERIC						
Captopril	Capoten	BMS	25mg/tab				Hypertension (& congestive heart failure)
Other brands? / Other strengths?							
Lowest price generic equivalent	GENERIC						
Ceftriaxone inj	Rocephin	Roche	1g/inj				3rd gen ceph. antibiotic
Other brands? / Other strengths?							
Lowest price generic equivalent	GENERIC						
Chloramphenicol	S Chloromycetin		500mg/tab				Antibiotic (C/E but side f/x)
Other brands? / Other strengths?							
Lowest price generic equivalent	GENERIC						

Generic name	Brand name(s)	Manufacturer	Strength / Dosage unit	Available? ("X" if yes)	Dosage unit sold to patient	Price per dosage unit	Comments
Ciprofloxacin	Ciproxin	Bayer	500mg/tab				Antibiotic
Other brands? / Other strengths?							
Lowest price generic equivalent	GENERIC						
Co-trimoxazole paed suspension	Bactrim	Roche	8+40mg/ml				Antibiotic... Also Septra brand, etc
Other brands? / Other strengths?							
Lowest price generic equivalent	GENERIC						
Diclofenac	Voltarol	Novartis	25mg/tab				Anti-inflammatory (& arthritis, menstrual pain)
Other brands? / Other strengths?							
Lowest price generic equivalent	GENERIC						
Erythromycin	S Erythrocin S Erythrocin		250mg/tab 500mg/tab				Antibiotic: many uses (esp resp tract, pneumonia)
Other brands? / Other strengths?							
Lowest price generic equivalent	GENERIC		250mg/tab				
Lowest price generic equivalent	GENERIC		500mg/tab				
Fluconazole	Diflucan	Pfizer	200mg/tab				Antifungal drug
Other brands? / Other strengths?							
Lowest price generic equivalent	GENERIC						
Fluoxetine	Prozac	Lilly	20mg/tab				Antidepressant
Other brands? / Other strengths?							
Lowest price generic equivalent	GENERIC						
Glibenclamide (glyburide)	Daonil	HMR	5mg/tab				Anti-diabetic
Other brands? / Other strengths?							
Lowest price generic equivalent	GENERIC						
Hydrochlorothiazide	Dichlotride	MSD	25mg/tab				Diuretic drug (e.g. hypertension)
Other brands? / Other strengths?							
Lowest price generic equivalent	GENERIC						
Metronidazole	S Flagyl	Pfizer	500mg/tab				Anti-infective
Other brands? / Other strengths?							
Lowest price generic equivalent	GENERIC						

Generic name	Brand name(s)	Manufacturer	Strength / Dosage unit	Available? ("X" if yes)	Dosage unit sold to patient	Price per dosage unit	Comments
Nevirapine	Viramune	Boehringer Ingelheim	200mg/tab				ARV drug (used in combo)
Other brands? / Other strengths?							
Lowest price generic equivalent	GENERIC						
Nifedipine Retard	Adalat Retard	Bayer	20mg/tab				Angina / hypertension (& premature labour, ...)
Other brands? / Other strengths?							
Lowest price generic equivalent	GENERIC						
Omeprazole	Losec	AstraZeneca	20mg/tab				Proton pump inhibitor (reduce gastric acid)
Other brands? / Other strengths?							
Lowest price generic equivalent	GENERIC						
Oral rehydration salts solution	S Hydrite						
Other brands? / Other strengths?							
Lowest price generic equivalent	GENERIC						
Paracetamol	S						
Other brands? / Other strengths?							
Lowest price generic equivalent	GENERIC						
Ranitidine	Zantac	GSK	150mg/tab				Reduce PUD / stomach acid
Other brands? / Other strengths?							
Lowest price generic equivalent	GENERIC						
Salbutamol inhaler	Ventoline	GSK	0.1mg/dose				Asthma + Resp.tract diseases
Other brands? / Other strengths?							
Lowest price generic equivalent	GENERIC						
Tetracycline	S						Antibiotic (esp gonorrhea, urin.tract infections, trachoma)
Other brands? / Other strengths?							
Lowest price generic equivalent	GENERIC						
Other Cephalosporins e.g. Cephalexin	S						Ceftriaxone separately recorded
Other Penicillin-based e.g. Phenoxymethyl penicillin	S						In semi-synthetic form (Amoxicillin Ampicillin separately recorded)
Other Quinolones e.g. Ofloxacin	S						Ciprofloxacin separately recorded

Appendix A7: PHARMACY USER EXIT SURVEY

A. Sampling information / Enumerator data (other than gender of interviewee, section can be filled out before pharmacy visit)

A1

District

A2

Interviewer name (print)

A3

Date of interview

/

Month / Date

A4

Survey ID number
(Enter "A" for Bais, "B" for Guilhulngan, "C" for Bayawan, "D" for Abuyog, "E" for Palompon, "F" for Taft, "G" for Oras
Interview number 1,2,3,etc / "F" if interviewee is female, "M" if male) e.g. B / 26 / F

/

/

A5

Name of pharmacy

A6

Pharmacy address

No.

Street

Barangay

Municipality

B. Suitability for interview
B1 Did you purchase any medication, such as drugs, creams, liquids?

Yes.....

continue with interview

No.....

do not proceed

NOTES FOR DATA COLLECTOR:

I.e. do not proceed if respondent: (a) didn't buy anything, (b) bought non-medical items such as bandages, toiletries, food/drink.

C. Consent [Waray Waray version used in Abuyog, Oras, Palompon and Taft districts]

Dear Respondent,

We wish to ask you a few questions on the medicines you purchased from this pharmacy today. The interview will take about 10 minutes. The main objective of this study is to understand drug purchasing habits.

The information that you will provide today will be completely anonymised (we will not use your name). The data will be used for research purposes only.

Your participation is voluntary. You may refuse to answer any question which you consider sensitive or confidential. Be assured that your answers will not affect your or your family's ability to receive care at this pharmacy or any hospital / other health facility.

If you have any questions, you can ask me or can contact our survey supervisor at UP Diliman by calling Chris James at 09163437665.

Your signature indicates that you understood the purpose and mechanics of this study and that you are willing to participate.

Signature of pharmacy customer

Signature of interviewer

PRINT NAME:

Dear Sir / Ma'am,

Mahangyo kami hit im guti na oras para pagpakiana han mga medisina nga ginpalit nimo yana na adlaw. Makunsumo la kita ma dyes minutos hin im oras. An panuyo hini na pag aram para masabtan an pamaagi han pamalit hin medisina.

An tanan na impormasyo na am makukuha ha im yana magpapabilin sekreto ngan gagamiton la hini na pag aram.

Boluntaryo it im pag apil hini na interbyu. Pwede nimu dire batonon kun mayda kami mga pakianan nga para ha im kumpedensyal. Ngatanan hit im baton dire makakaapekto hit ano man na pribilihiyo na makukuha mo ngan hit im pamilya hini na botika ngan ha iba pa na panlawas na pasilidad

Kun mayda ka mga pakiana,pwede mo makontak an SURVEY . SUPERVISOR ha UP DILIMAN na hi Chris James ha iya telepono 09163437665

It imo pirma nagpapamatuod na naintindihan mo tanan nga panuyo ngan . pamaagi hini na pag aram,ngan nagpapamatuod gihap na nasugot ka pagpartisipar

C. Consent [Cebuano version used in Bais, Bayawan and Guilhulgnan districts]

Dear Respondent,

We wish to ask you a few questions on the medicines you purchased from this pharmacy today. The interview will take about 10 minutes. The main objective of this study is to understand drug purchasing habits.

The information that you will provide today will be completely anonymised (we will not use your name). The data will be used for research purposes only.

Your participation is voluntary. You may refuse to answer any question which you consider sensitive or confidential. Be assured that your answers will not affect your or your family's ability to receive care at this pharmacy or any hospital / other health facility.

If you have any questions, you can ask me or can contact our survey supervisor at UP Diliman by calling Chris James at 09163437665.

Your signature indicates that you understood the purpose and mechanics of this study and that you are willing to participate.

Signature of pharmacy customer

PRINT NAME:

Signature of interviewer

Dear sir/ma'am,

Naa mi mga pangutana sa inyo kabahin sa mga medisina nga inyong gipalit karon diri sa parmasya. Ang interview moabot ug 10 minutos. Ang tumong ni-ini mao ang pag tuon sa mga naandang pamaagi sa pagpalit ug mga medisina.

Ang tanan impormasyon nga imong mahatag magpabilin nga tagol (dili ipahibalo ang inyong ngalan). Kini gamiton lamang sa research.

Ang imong pagsalmot boluntaryo. Pwede ka mobalibad sa mga pangutana nga imong paminaw sensitibo o konpidsensyal. Salig nga dili kani maka apektar sa paghatag ug pagtagad sa imo o kaha sa imong pamilya niining parmasya/hospital/ubang nga health facility.

Kung naa kay pangutana pwede ka mangutana sa ako o sa among survey Supervisor sa UP Diliman sumala sa patawag kang Chris James sa 09163437665

Ang imong pagpirma nagpasabot nga nitugot ug nakasabot ka sa katuyoani ug pamaag niini nga pagtuon.

D. Questionnaire

D1 Did you receive a prescription for your purchases?
(Circle one)

Yes..... 1
No... (skip to D3) 2

D2 Did you receive this prescription from...
(Read list, circle one and specify name of health facility + if known name of health professional)

..... hospital*	1
Rural health unit (specify name)	2
Private health clinic (specify name)	3
Other (specify name)	4

NOTES FOR DATA COLLECTOR:

* Read out name of district hospital in the town (i.e. Taft District Hospital, Oras District Hospital or Balangiga District Hospital)

D3 What are the name/s, quantities and price/s of the medicine/s that you purchased?
(Check receipt / Start new line for each different kind of medicine bought)

Generic name	Brand name (if generic, write "GENERIC")	Dosage unit	Strength	# dosage units purchased	Price per dos.unit
e.g. Amoxicillin	e.g. GENERIC	e.g. TAB	e.g. 500mg / TAB	e.g. 21 TAB	e.g. 5

NOTES FOR DATA COLLECTOR:

Generic name : examples include- Amoxicillin; Ciprofloxacin; Ceftriaxone; Azelaic acid (20%)

Brand name : corresponding examples- Amoxil; Ciproxin; Rocephin; Generic

Dosage unit : a medicine may be available in different dosage units/forms. Specify which of following has been bought:

(a) tablets / capsules... write "TAB " (b) cream / ointment... write "CRE " (c) dose in vial/liquid form to be injected... write "INJ "

(d) mixture / powder / suspension / liquid (other than for injection)... write "MIX " (e) all other dosage forms... write " OTH " (note shouldn't need to use OTH)

Strength : refers to strength of the dosage unit. Examples include: 250mg/TAB; 30g/CRE; 0.5mg/INJ; 200ml/MIX; 100mg/OTH

dosage units purchased: refers to the number of tablets; packets; bottles; etc purchased.

Price per dosage unit: i.e. price per tablet / price per packet / price per bottle, etc purchased

D4 Why did you go to this pharmacy? Please specify all that apply
(Read list and circle all that apply)

- Proximity to home
- Proximity to work
- Because you knew the medicine/s was available here
- Because you knew the price of the medicine/s was cheap here
- Recommended by health professional (if Yes, also ask D4.1)
- Other (specify)
- 1
- 2
- 3
- 4
- 5
- 6

D4.1 Was the health professional from.....
(Circle one and specify name of health facility + if known name of health professional)

..... hospital*	1
Rural health unit (specify name)	2
Private health clinic (specify name)	3
Other (specify name)	4



D5 Which one of these reasons (question D4) was the most important?
(Re-read list and write code [one of 1-6] that applies in shaded box)

D6 Did you purchase these drugs for yourself?
(Circle one then ask ***EITHER D6.1 (if answered Yes) OR D6.2 (if answered No)***)

- Yes...(answer D6.1).....
- No...(answer D6.2)
- 1
- 2

D6.1 i. What is your age?

__ __ years __ __ months

ii. What is your date of birth?

__ __ / __ __ / __ __
Month / Date / Year

D6.2 i. What is your relationship to the patient?
(Read list and circle one)

- Mother or Father.....
- Grandparent.....
- Brother or sister.....
- Wife or Husband.....
- Grandson or Granddaughter.....
- Yaya or house help.....
- Other non-relative.....
- 1
- 3
- 5
- 7
- 9
- 11
- 13
- Aunt or Uncle.....
- Stepparent.....
- Cousin.....
- Son or Daughter.....
- Other relative.....
- Neighbour.....
- 2
- 4
- 6
- 8
- 10
- 12

ii. What is the patient's age?

__ __ years __ __ months

iii. What is the patient's date of birth?

__ __ / __ __ / __ __ __ __
Month / Date / Year

iv. What is the patient's gender?

Male..... 1
Female..... 2

D7 For what illness did you purchase this medication/s? If more than one applies, please only indicate the most important one
(Read list and circle one)

- Pneumonia..... 1
- Diarrhea..... 2
- A High Fever..... 3
- Problem related to delivery..... 4
- Other infection (incl. parasites)..... 5
- Accident/Injury..... 6
- Cold/cough..... 7
- Vomiting..... 8
- Convulsions..... 9
- Abdominal Pain..... 10
- Difficulty Breathing..... 11
- Skin problem..... 12
- Tuberculosis..... 13
- Other (specify) _____ 14

D8 Did you purchase all of the medications that you were prescribed?
(Circle one)

Yes... (skip to D10) 1
No..... 2

D9 Why not?

(Summarise respondent's answer and write related code in shaded box)

NOTES FOR DATA COLLECTOR: Code- 1=cost of medications; 2=didn't think it was necessary; 3=Other

D10 Did this price include a discount?
(Circle one)

Yes..... 1
No..... 2
Don't know..... 99

D11 Will you claim reimbursement from PhilHealth?
(Circle one)

- | | |
|-----------------------------------|---|
| Yes..... | 1 |
| No (but I am a PhilHealth member) | 2 |
| No, I am not a PhilHealth member | 3 |

D12 Will you claim reimbursement from any other health insurance?
(Circle one - if do have other health insurance, write it down)

- | | |
|---|---|
| Yes..... | 1 |
| No (but I do have other health insurance) | 2 |
| No, I do not have other health insurance | 3 |

D13 Do you own a...?
(Read list and circle all that apply)

- | | | |
|------------------------|-----|----|
| | Yes | No |
| Radio | 1 | 2 |
| TV | 1 | 2 |
| Refrigerator | 1 | 2 |
| Washing machine | 1 | 2 |
| Air conditioning | 1 | 2 |
| Sala / living room set | 1 | 2 |
| Cell phone | 1 | 2 |
| Car | 1 | 2 |

D14 What was the approximate total income of your household in the last 12 months?
(Read list and circle one)
[if exact income known, write down]

- | | |
|------------------------------------|---|
| 10,000 pesos or less..... | 1 |
| Between 10,001-25,000 pesos..... | 2 |
| Between 25,001-50,000 pesos..... | 3 |
| Between 50,001-75,000 pesos..... | 4 |
| Between 75,001-100,000 pesos..... | 5 |
| Between 100,001-150,000 pesos..... | 6 |
| Between 150,001-200,000 pesos..... | 7 |
| Between 200,001-600,000 pesos..... | 8 |
| Greater than 600,000 pesos..... | 9 |

**An Unhealthy Public-Private Tension:
The Impact of Physician Pharmacy Ownership on
Prescribing Practices and Patient Spending in the
Philippines**

Abstract

Pharmacy ownership by physicians may create perverse financial incentives for doctors to over-prescribe, prescribe products with higher profit margins, and direct patients to their pharmacy. Interviews with pharmacy customers in the Philippines show that customers using pharmacies owned by public sector doctors had 5.4 greater odds of having a prescription from public hospital physicians, and spent 49.3% more than customers using other pharmacies. For customers purchasing branded medicines, switching to generics would reduce pharmaceutical spending by 58%. Controlling out-of-pocket expenditure on drugs requires policies to control financial links between doctors and pharmacies, as well as tighter regulation of non-generic prescribing.

1 Introduction

Public sector doctors in low-middle income countries are often poorly paid ⁽¹⁾. Consequently, many undertake additional work or invest in the private sector; some even leave the public sector altogether. One common strategy is for doctors to own, or have financial links with, pharmacies, diagnostic clinics and other private health facilities ^(2; 3; 4). Pharmacy ownership by doctors potentially creates a perverse financial incentive to over-prescribe, prescribe products with higher profit margins, and convince patients to use their pharmacy.

A doctor's incentive to obtain a share in a private pharmacy, and the perverse incentives that can emerge from this, are more marked when patients pay directly for drugs themselves or when drugs are retrospectively reimbursed by insurers on a fee-for-service basis (as compared with prospective drug reimbursement). In such circumstances, financial gain is directly linked to prescribing strategies.

Whether or not doctors actually act on these incentives depends on the relative weight they place on personal financial gain and a patient's well-being, assuming these two objectives are not aligned. That is, their clinical behavior depends on how 'perfect' an agent the doctor is for the patient ⁽⁵⁾. If they are not a perfect agent, these perverse financial incentives will lead to patients (and third-party payers) spending more than they need to, purchasing medical care that is not needed, or forgoing an opportunity to substitute branded for generic medications. In some cases, this may even be detrimental to their health.

To evaluate whether public sector doctors are affected by these personal financial incentives, we interviewed pharmacy customers in the Philippines after they had purchased medicines from a pharmacy. Customers were asked whether they had a prescription, if so, from whom, and how much they spent. Data on the price and availability of selected essential medicines were also collected from pharmacies and public district hospitals. Accordingly this paper addresses three related research questions:

1. Do physicians owning or having financial links with a private pharmacy influence patients to purchase medicines from their pharmacy?
2. Do patients with prescriptions from pharmacy-owning physicians spend more in pharmacies than patients with prescriptions from other physicians?
3. Would patients with prescriptions from a pharmacy-owning public physician spend less on medicines if generic versions were fully available within public district hospitals?

2 Methods

2.1 Study context and sampling issues

Study context

A network of public health facilities offers integrated healthcare services in the Philippines. There are also many private providers, particularly in larger urban areas. Public facilities are predominantly financed by Local Government Units (LGUs). However, this is not sufficient to cover their operating costs, with shortfalls financed through Philippine Health Insurance Corporation (PHIC) contributions and user charges. PHIC, the publicly sponsored national health insurance company, does not yet provide universal coverage. Benefits are capped and limited mainly to inpatient cases, so that co-payments for the insured can be high, particularly for those with protracted or serious illnesses.

The pharmaceutical retail market in the Philippines is dominated by commercial pharmacies, which account for 85% of drugs sold (⁶). Patients can also purchase medicines in hospital pharmacies but availability is limited, particularly in government hospitals. Patients with PHIC membership, however, can later claim reimbursement for prescribed medicines purchased in pharmacies up to a pre-specified ceiling if the medications and supplies were not available within public hospitals.

Our study was connected to the Philippine Child Health Experiment, known locally as QIDS (see also the QIDS website <http://QIDS.ph>). QIDS is an ongoing study exploring the impact of two policy interventions: expanded insurance coverage for children; and performance-based payments for hospitals and physicians. It was undertaken in 30 randomly selected districts in

the Visayan island group and the northern tip of Mindano (for a comprehensive discussion of the QIDS methodology, see ⁷). QIDS provided us with detailed information on these districts' hospital facilities, including the physicians working there; and anecdotal information on potential public physician ownership of private pharmacies.

Pharmacy sample frame

Seven districts were purposively selected from among the 30 QIDS study districts. District selection was based on there being at least one pharmacy owned by a public hospital physician; all three intervention arms of the QIDS study were represented.

The inclusion criteria for pharmacies in these seven districts were: (i) all pharmacies owned by, or with direct familial links (parent, sibling or offspring) to, a public hospital physician; (ii) all pharmacies owned by, or with direct familial links to, a private clinic physician; (iii) all pharmacies located next to the hospital (i.e. on the same street and within two minutes' walk); (iv) controls of two or more randomly selected independent pharmacies per site, with ideally at least one of these next to the hospital and at least one further away (i.e. 5 to 30 minutes' walk away). An independent pharmacy is defined as: a pharmacy that is not owned by, nor has direct familial links with, a public or private physician.

Screening interviews were administered with the pharmacy owner and/or chief pharmacist, establishing who owned each pharmacy. They were undertaken for all pharmacies within each district's main commercial center. Of the 46 pharmacies that were screened, 39 were eligible for study. Of the seven that did not participate, three refused to be interviewed (all independently owned), and four were closed throughout the study period (two independently owned; two with familial links to public hospital physicians).

Patient data collection

Data collection took place over the three month period of March-May 2007. We interviewed patient respondents immediately after purchasing medicines from a pharmacy. Respondents were asked if they received a prescription, and if so, from whom, what they bought, and questions

related to their socioeconomic status and the illness for which medicines were purchased. 40-60 customers were interviewed per pharmacy, with a minimum timeframe of one day per pharmacy. In each pharmacy, all customers purchasing any kind of medication were interviewed. Interviewing was sequential and done by local research assistants trained by the lead author. Interviews were administered in the local dialect, encompassed 14 questions, and took about 10 minutes to complete. All interviewees were adults, although approximately a quarter of them were purchasing medicines for children.

2.2 Model specification

Three models are specified, each addressing one of the paper's three research questions. They are summarized below, with further details given in the technical appendix.

- 1. Do physicians owning or having financial links with a private pharmacy influence patients to purchase medicines from their pharmacy?

The approach is to model the probability that a patient (the pharmacy customer or the person for whom the customer was buying the medicines for) received a prescription from a public hospital physician. This uses a logistic model, with the main variable of interest indicating whether a pharmacy is linked to a physician. Various control variables at both pharmacy and pharmacy customer levels are included. Reasons given for why a customer chose to use a physician-owned pharmacy were also analyzed.

- 2. Do patients with prescriptions from pharmacy-owning physicians spend more in pharmacies than patients with prescriptions from other physicians?

This analyzes pharmacy expenditures, using a semi-logarithmic ordinary least squares specification. It focuses on the sub-sample of pharmacy customers with prescriptions from a public hospital, comparing expenditures of customers with a prescription from a pharmacy-owning public physician with those having a prescription from other public physicians. The data collected did not distinguish between patients with prescriptions for inpatient treatment or outpatient use.

- 3. Would patients with prescriptions from a pharmacy-owning public physician spend less on medicines if

generic versions were fully available within public district hospitals?

This involved analyzing the sub-sample of individuals with a prescription from a pharmacy-owning public hospital physician. These individuals' observed drug expenditure in pharmacies was compared with what they could have spent on the same medicines if generic versions were fully available within public district hospitals. Quantities of medicines purchased in a hospital are assumed to be the same as observed quantities purchased in pharmacies. That is, it is assumed that a physician's prescription practice would remain unchanged, implying no demand inducement (or, equivalently, the same level of inducement for patients purchasing medicines inside or outside the hospital).

3 Results

3.1 Descriptive statistics

Of the 39 pharmacies, 6 were owned by public physicians, 3 were owned by private physicians and 30 were independently owned. 11 of 39 pharmacies were located on the same street as the hospital; the remaining 28 were a 5-15 minute motorcycle ride away.

Just under half of the sample (625 of 1322) had a prescription (compared with over-the-counter purchases). Further, 425 (32%) had a prescription from a public district hospital physician - 221 (17%) from a pharmacy-owning public physician and 204 (15%) from other public physicians. Over 60% of the sample reported household incomes that were in the bottom quintile of the national income distribution (source: Philippine National Statistics Office:

<http://www.census.gov.ph/data/sectordata/2003/ie03fr18.htm>). Asset ownership was positively associated with reported household income.

Exhibit 1: Pharmacy customer characteristics [INSERT HERE]

3.2 Do physicians owning or having financial links with private pharmacies influence patients to purchase medicines from their pharmacies?

Pharmacy customers using a pharmacy owned by a public physician were 5.4 times more likely (5.4 higher odds) to receive a prescription from a public physician than were customers using pharmacies not owned by a public

physician. Further, those with a prescription from a public physician had 6.2 higher odds of using pharmacies located in the immediate vicinity of the town's public hospital than other pharmacies. Customers with PHIC insurance and planning to claim had 1.8 greater odds of having a prescription from a public physician. There was also noticeable variability in results across districts.

Exhibit 2: Probability of prescription from public hospital physician [INSERT HERE]

To better understand the ability of physicians to influence a patient's drug purchasing behaviour, we analyzed the reasons customers gave for using physician-owned pharmacies (see exhibit 3). Among the customers with a prescription from a pharmacy-owning public physician and using that physician's pharmacy, 61% cited the influence of a health professional as the main reason (52% were recommended, and 9% referred, by a health professional). The respective figure for customers with prescriptions from other public physicians was 26% (23% recommended, 3% referred). This difference (26% v 61%) was statistically significant ($\chi^2=5.29$, $p\text{-value}<0.025$).

Exhibit 3: Reasons given by customers for using a particular pharmacy [INSERT HERE]

3.3 Do patients with prescriptions from pharmacy-owning physicians spend more in pharmacies than patients with prescriptions from other physicians?

A first analysis (2a) showed that customers using a public physician-linked pharmacy spent 49.3% more ($p\text{-value}=0.005$) than those using other pharmacies. However, it also showed that those with a prescription from a pharmacy-owning public physician spent 37.4% ($p\text{-value}=0.048$) less than those with prescriptions from other public physicians.

Patients using pharmacies located in the immediate vicinity of a town's public hospital spent 63% more than those using other pharmacies ($p\text{-value}=0.019$). There was also variability in results across districts.

A second analysis (2b), comparing four customer subgroups, showed that customers with prescriptions from pharmacy-owning public physicians only spent less than

those with prescriptions from other public physicians if they used pharmacies not owned by these public physicians. These subgroups were: (1) customers with prescriptions from pharmacy-owning public physicians and using their pharmacies; (2) customers with prescriptions from pharmacy-owning public physicians but using other pharmacies (regression reference group); (3) customers with prescriptions from other (non-pharmacy owning) public physicians and using pharmacies linked to public physicians; (4) customers with prescriptions from other public physicians and using other pharmacies.

Exhibit 4: Determinants of pharmaceutical expenditures [INSERT HERE]

3.4 Would patients with prescriptions from a pharmacy-owning public physician spend less on medicines if generic versions were fully available within public district hospitals?

Exhibit 5 illustrates the extent of potential savings if customers purchased generics rather than branded medicines:

Exhibit 5: Actual versus simulated average expenditures on surveyed medicines [INSERT HERE]

Extrapolating these results to all pharmacy customers with a prescription from a pharmacy-owning public hospital physician shows that noticeable expenditure savings could be generated. For the 88% of these customers who purchased branded medicines, expenditure could be reduced by 58% on average (median), saving \$4.2 (since their average expenditure was \$7.7), if they purchased only generic medicines. This assumes price differences between generic and branded versions for other medicines are the same as for medicines analyzed in the simulation sub-sample.

4 Discussion

This paper investigates whether doctors respond to the incentives created by financial links with pharmacies, and evaluates the financial implications of those behaviors. We found that pharmacy-owning physicians in the Philippines appear to persuade patients to use their pharmacy in preference to alternative pharmacies. After controlling for other factors, results demonstrated that

customers using public physician-owned pharmacies had 5.4 greater odds of having a prescription from a public hospital physician.

Customers using public physician-owned pharmacies spent 49% more than those using other pharmacies. In determining expenditures, the type of pharmacy a customer purchased their medicines from was more important than who gave them their prescription. Doctors who owned pharmacies did not prescribe more expensive medicines than other hospital physicians. However, physician ownership of private pharmacies remains a concern because of the finding that pharmacy-owning public physicians persuade patients to utilize their pharmacies. Further, for customers purchasing branded medicines, switching to generic medicines would reduce pharmaceutical spending to an average of 42% (range of 19%-81%) of their actual expenditure. This finding implies that there are potentially significant savings for both individuals paying out-of-pocket and third-party payers.

Our research adds to the literature by demonstrating the impact physician pharmacy ownership has on pharmacy customers. Results are consistent with other studies that have analyzed financial links between doctors and health facilities. In the US, physicians linked to private facilities consistently had different referral behaviour, resulting in policy regulations - the Stark laws (see Manchikanti and McMahon 2007 for details) - that severely limited self-referrals. Many studies, dating back more than 20 years, showed how utilization and profits of facilities providing ancillary and outpatient services in the US were higher if these facilities had financial links with physicians^(3,8,9,10,11). In Taiwan, researchers analysing outpatient clinics found that the probability of prescription and drug expenditure per visit were, respectively, 17-34% and 12-36% less amongst visits to clinics without "on-site" pharmacists - pharmacists hired by physicians to dispense the drugs they prescribe⁽²⁾. Later studies found that pharmacies linked with physicians accounted for a large and growing proportion of prescriptions in Taiwan^(12,13).

Other studies evaluated the prescribing practices of dispensing doctors. In South Korea, prescriptions for

antibiotics and injections fell following the separation of drug prescribing and dispensing in 2000. However, these were offset by physician demands for compensatory higher medical fees and an increase in prescriptions of high-price drugs (^{14,15}). In Zimbabwe, dispensing doctors prescribed more medicines than non-dispensing doctors, and dispensing with prescription lowered the quality of care (^{16,17}). In the UK, dispensing practices prescribed more items per patient (and fewer of them generically) than non-dispensing practices¹⁸. More broadly, the empirical literature on provider payment mechanisms demonstrated that the amount of services a physician gives a patient is dependent on the financial incentives s/he faces (^{19,20}).

Still, our study has some important limitations. First, data were not collected from patients that bought medicines in the hospital pharmacy, nor from patients who did not buy any of the medicines they were prescribed. Nonetheless, other data from the QIDS study showed that for 98.7% of inpatient cases younger than six, the parent/carer had to obtain additional prescribed medicines outside of the hospital, so bias from this source is unlikely. Secondly, districts and pharmacies were selected purposively; however, the participation rate among both pharmacies and pharmacy customers was high and there is no *a priori* reason to think that the results are driven by the sampling frame. Third, there is a possibility that some physicians with links to pharmacies were not identified. Although pharmacy screening interviews ascertained whether pharmacies had direct familial links to specific physicians, it is still possible that more informal links between pharmacies and physicians were not captured. This would mean that certain pharmacies classified as "independent" actually had physician links. This form of misclassification would tend to underestimate the actual differences between pharmacy ownership types. Fourth, although results illustrated that pharmacy-owning public physicians were able to persuade patients to utilize their pharmacy, the research only began to explore how they are able to do this. Qualitative research methods might have captured this more effectively. Further, we did not analyze a physician's decision to obtain pharmacy ownership stakes, and consequently if (and if so, how) pharmacy-owning physicians differ from other physicians. Finally,

the analysis could not analyse the linkage between physicians owning private pharmacies and the number of prescriptions. Pharmacy-owning physicians face a stronger financial incentive to over-prescribe. Although Model 2 showed that health expenditures were higher in public physician-owned pharmacies, it cannot show if this is explained by more prescriptions or if it is just more expensive medicines being prescribed and thus it is not possible to disentangle price and quantity effects. Potential over-prescription also implies that the cost savings in Model 3 would have been under-estimated.

The phenomenon of public physicians in low- and middle-income countries engaging in private sector activities is widespread (²¹; ²²). Debate continues on how best to address such behavior. Our findings suggest a range of policy responses to physician ownership of private pharmacies. At the one extreme, banning physicians from owning pharmacies would remove the perverse financial incentives associated with pharmacy ownership. However, such a policy is likely to be difficult to enforce, and physicians might still maintain financial links with pharmacies without actually owning them, particularly if the underlying issue of low physician salaries is not addressed. Experiences from South Korea¹⁵ and Taiwan² suggest that such a policy cannot succeed in isolation.

Another policy option is to improve the availability of generic medicines in public hospitals. This could produce significant savings for patients and third-party payers, and also offer revenue opportunities for hospitals. It would have the additional benefit of putting pressure on outside pharmacies to carry generic medicines and to offer medications at competitive prices. However, as this study indicates, there would also need to be adequate monitoring of prescribing practices since there is no guarantee that pharmacy-owning public physicians would not continue to try and persuade patients to use their pharmacies. Policymakers might also focus on ensuring private pharmacies stock generic versions of essential medicines (already the law). However, if pharmacy customers regularly demanded generics, private for-profit pharmacies would more readily supply them.

This implies a more general problem with generics: customers may perceive them to be of inferior quality to

branded medicines, and/or physicians recommend branded products. Indeed, anecdotal evidence from this study suggests that prescriptions often exclude the medicine's generic name, even though this is in conflict with Philippine law (Republic Act No.6675). Thus for generics to be more widely used, there needs to be better monitoring of physicians' prescriptions, and, more generally, any concerns about the quality of generics needs to be assuaged. PHIC could regulate physicians' prescribing practices, given their experience in evaluating physician claims, and since they have the incentive of significant cost savings to do so. However, for this to cover a large proportion of prescriptions, PHIC reimbursement would need to be expanded to cover outpatient prescription medicines.

Finally, it should be remembered that public physicians' salaries are typically low, relative to what they could earn elsewhere. Policymakers must recognise this, since physician ownership of private pharmacies, and the associated perverse financial incentives that emerge, are likely to be driven by the need to cope with low public sector wages.

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Exhibit 1: Pharmacy customer characteristics

Variable	N	%
OTC v PRESCRIPTIONS, & PRESCRIPTION TYPE		
Over-the-counter purchase	697	53%
Prescription from pharmacy-owning public physician	204	15%
Prescription from other public physician	221	17%
Prescription from pharmacy-owning private physician	77	6%
All other (i.e. non-hospital based) prescriptions	123	9%
SOCIOECONOMIC / DEMOGRAPHIC CHARACTERISTICS		
Household assets		
Radio	1093	83%
TV	930	70%
Refrigerator	594	45%
Washing machine	244	18%
Air conditioning	57	4%
Sala (living room) set	321	24%
Cell phone	735	56%
Car	110	8%
Annual household income		
<10,000	317	24%
10,001-25,000	307	23%
25,001-50,000	228	17%
50,001-75000	157	12%
75,001-100,000	93	7%
100,001-150,000	99	7%
150,001-200,000	50	4%
200,001-600,000	67	5%
>600,000	4	0%
Health insurance status of patient		
PHIC member and will claim	132	10%
PHIC member but won't claim	393	30%
Not PHIC member	797	60%
Age of patient		
Age <=5	204	15%
Age 6-17	146	11%
Age 18-39	357	27%
Age 40-59	364	28%
Age 60+	251	19%
Gender of patient		
Female	730	55%
Male	592	45%

Exhibit 2: Probability of prescription from public hospital physician

Model 1: Probability of prescription from a public hospital physician

n = 1322
LR = 619, Prob>LR =0.00
Pseudo R2=0.37; AIC*n=1085

Variable	O.R.	se	z	P> z
PHARMACY LINKED TO DOCTOR	5.427	2.17	4.24	<0.0001
Pharmacy located next to hospital	6.152	2.20	5.08	<0.0001
Abuyog district	3.319	1.32	3.02	0.0020
Bais district	2.034	0.83	1.74	0.0810
Guilhulgnan district				
Palompon district	28.703	14.24	6.77	<0.0001
Oras district	6.172	2.31	4.87	<0.0001
Taft district	10.036	3.69	6.27	<0.0001
Household assets	0.502	0.26	-1.32	0.1880
PHIC member and will claim	1.796	0.52	2.02	0.0430
Age <= 5				
Age 6-17				
Age 18-39				
Age 40-59	0.632	0.15	-1.94	0.0520
Female				

Bayawan is reference district; case-mix proxies also included. Data clustering at the pharmacy level was adjusted for. Variables shown without statistics were excluded from the final model on the basis of the Akaike Information Criterion.

Exhibit 3: Reasons given by customers for using a particular pharmacy

	Prescription from pharmacy-owning public doctor & using that doctor's pharmacy (n=166)				Prescription from other public doctor (n=222)			
	One of reasons		Main reason		One of reasons		Main reason	
	n	%	n	%	n	%	n	%
Proximity to home	24	14%	5	3%	59	27%	28	13%
Proximity to work	4	2%	3	2%	24	11%	8	4%
Knew medicine/s was available here	35	21%	20	12%	140	63%	52	23%
Knew medicine/s was cheap here	18	11%	15	9%	72	32%	35	16%
Recommended by health professional	88	53%	86	52%	77	35%	52	23%
Referred here	15	9%	15	9%	6	3%	6	3%
Proximity to hospital	14	8%	12	7%	41	18%	35	16%
Other	12	7%	10	6%	6	3%	6	3%

Exhibit 4: Determinants of pharmaceutical expenditures

Model 2: Determinants of expenditure in pharmacies	Model 2a				Model 2b			
	n = 425; F=24.4, Prob>F=0.00 R2 = 0.1831; AIC=1253				n = 425; F=20.7, Prob>F=0.00 R2=0.1834; AIC=1255			
	Coeff.	se	t	P> t	Coeff.	se	t	P> t
PHARMACY LINKED TO DOCTOR	0.493	0.16	3.06	0.0050	NA	NA	NA	NA
Prescription type=1	-0.374	0.18	-2.08	0.0480	NA	NA	NA	NA
Pres.type=1 + used pharm.linked to doctor	NA	NA	NA	NA	0.545	0.16	3.46	0.0020
Pres.type=2 + used pharm.linked to doctor	NA	NA	NA	NA	0.880	0.26	3.43	0.0020
Pres type=2 + used other pharmacy	NA	NA	NA	NA	0.436	0.25	1.77	0.0900
Pharmacy located next to hospital	0.631	0.25	2.51	0.0190	0.644	0.26	2.46	0.0220
Abuyog district	-0.362	0.18	-2.06	0.0500	-0.345	0.20	-1.73	0.0960
Bais district	-0.493	0.25	-1.95	0.0640	-0.512	0.27	-1.87	0.0740
Gulihulgnan district								
Palompon district	0.632	0.28	2.26	0.0330	0.645	0.28	2.29	0.0310
Oras district	0.358	0.20	1.77	0.0890	0.357	0.20	1.77	0.0890
Taft district								
Household assets	0.619	0.47	1.33	0.1970	0.613	0.46	1.34	0.1910
PHIC member and will claim								
Age <= 5								
Age 6-17								
Age 18-39	-0.166	0.12	-1.44	0.1610	-0.167	0.11	-1.46	0.1590
Age 40-59								
Female								
Constant	4.261	0.24	17.45	<0.0001	3.835	0.30	12.81	<0.0001

Key to prescription types: 1=from pharmacy-owning public hospital doctor, 2=from other public hosp doctor
Bayawan is reference district; case-mix proxies also included. Pharmacy level data clustering adjusted for.
Variables without statistics were excluded from the final model on the basis of the Akaike Information Criterion.

Exhibit 5: Actual versus simulated average expenditures on surveyed medicines

	Branded drugs purchased (n=32)		Only generics purchased (n=16)		Full sub-sample (n=48)	
	Philippine Pesos	% actual expenditure	Philippine Pesos	% actual expenditure	Philippine Pesos	% actual expenditure
Actual expenditure*	153	-	121	-	142	-
Simulated expenditure [Sim_exp], lowest drug price	29 ^a	19%	50 ^a	41%	36 ^a	25%
Sim_exp, mean drug price	62 ^a	41%	82 ^a	68%	69 ^a	49%
Sim_exp, median drug price	65 ^a	42%	88 ^b	73%	73 ^a	51%
Sim_exp, highest drug price in private pharmacy	109 ^a	71%	153	126%	124 ^c	87%
Sim_exp, max drug price in private or hosp. pharmacy	124 ^a	81%	170	140%	139	98%

*on drug/s for which pricing data was collected (average total expenditure in pharmacy is higher)
Simulated expenditure statistically less than actual exp. at ^a99%, ^b95%, ^c90% significance level.